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RECORD OF DECISION OPERABLE UNIT 13 (OU13) SITES 8 AND 24 NAS PENSACOLA FL
9/1/2006
TETRA TECH

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055

Rev. 3
09/14/06

Record of Decision
for
Operable Unit 13
(Sites 8 and 24)

Naval Air Station Pensacola
Pensacola, Florida

Contract Task Order 0030

September 2006

NAVFAC Naval Facilities Engineering Command
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

RECORD OF DECISION
FOR
OPERABLE UNIT 13
(SITES 8 AND 24)

NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

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Southern Division
Naval Facilities Engineering Command
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North Charleston, South Carolina 29406

Submitted by:
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CONTRACT NO. N62467-04-D-0055
CONTRACT TASK ORDER 0030

SEPTEMBER 2006

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List of Abbreviations

The following list contains many of the abbreviations, acronyms and symbols used in this document. A glossary of technical terms is provided in Appendix A.

ARAR	Applicable or Relevant and Appropriate Requirement
BAP	Benzo(a)pyrene
BBF	Benzo(b)fluoranthene
BEQ	Benzo(a)pyrene equivalent concentration
bls	below land surface
BRA	Baseline Risk Assessment
BTOC	Below top of casing
CEC	Cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CG	Cleanup Goal
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CTL	Cleanup Target Levels
CY	Cubic Yard
DAA	Dibenz(a,h)anthracene
DDT	Dichloro-diphenyl-trichloroethane
E&E	Ecology & Environment, Inc.
EPA	Environmental Protection Agency
FDER	Florida Department of Environmental Regulation (since renamed Florida Department of Environmental Protection [FDEP])
FFA	Federal Facilities Agreement
FGCL	Florida Guidance Concentration for Leaching
FGGC	Florida Groundwater Guidance Concentration
FFS	Focused Feasibility Study
FPDWS	Florida Primary Drinking Water Standard
FS	Feasibility Study
FSDWS	Florida Secondary Drinking Water Standard
ft	feet
ft/day	feet per day
ft^2/day	square feet per day
gpm	gallons per minute
HHRA	human health risk assessment
HI	Hazard Index

IAS	Initial Assessment Study
ILCR	Incremental Lifetime Cancer Risk
IRP	Installation Restoration Program
lbs/ft3	pounds per cubic foot
LOAEL	Lowest observed adverse effect level
LS	Lump Sum
LUCAP	Land Use Control Assurance Plan
MC	Methylene chloride
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
mEq/100 g	milliequivalent per 100 grams
µg/kg	microgram per kilogram
mg/kg	milligram per kilogram
µg/L	microgram per liter
mg/L	milligram per liter
msl	mean sea level
NAS	Naval Air Station
NCP	National Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NOAEL	No-observed-adverse-effects level
NPL	National Priorities List
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychorinated Biphenyl
ppb	parts per billion
PPE	Personal protective equipment
ppm	parts per million
PWC	Public Works Center
QA/QC	Quality assurance/quality control
RAB	Restoration Advisory Board
RBC	Risk based concentration
RC	Reference concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
Rf	Retardation factor
RG	Remedial Goal
RGO	Remedial Goal Option
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act

SMCL	Secondary Maximum Contaminant Level
SOUTHNAVFACENGCOM	Southern Division Naval Facilities Engineering Command
SSL	Soil screening level
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
SY	Square yard
TBC	To-be-considered
TCE	Trichloroethene
TOC	Total Organic Carbon
TRC	Technical Review Committee
TRPH	Total recoverable petroleum hydrocarbon
USEPA	U.S. Environmental Protection Agency
U.S.C.	United States Code
VC	Vinyl chloride
VOC	Volatile Organic Compound

DECLARATION OF THE RECORD OF DECISION

Site Name and Location

Operable Unit 13, Site 8 — Public Works Center and Site 24 — DDT Mixing Area
Naval Air Station Pensacola
Pensacola, Florida

Statement of Basis and Purpose

This decision document (Record of Decision), presents the selected remedy for Operable Unit 13 at the Naval Air Station Pensacola, Pensacola, Florida. The remedy was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. § 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP), 40 Code of Federal Regulations Part 300. This decision is based on the administrative record for Operable Unit 13 at the Naval Air Station Pensacola.

The Florida Department of Environmental Protection concurs with the selected remedy.

Assessment of the Operable Unit

The Navy has determined that no action is necessary for OU 13 soil to protect public health or welfare or the environment based on the remedial investigation and soil removal action performed at the site under a residential scenario. The groundwater response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. A release to soil was identified and was addressed previously by a removal action. Contamination remaining at OU 13 is confined to groundwater only.

Description of the Selected Remedy

This action is the first and final action planned for this operable unit. OU 13 is one of 14 operable units at NAS Pensacola. No further action is necessary for OU 13 soil to ensure protection of human health and the environment. The action in this ROD also addresses residual groundwater contamination.

The major components of the remedy are:

- Land Use Controls to restrict groundwater use of the surficial zone of the Sand-and-Gravel Aquifer until cleanup levels are met.

- Groundwater monitoring in accordance with a Monitoring Plan to monitor expected reductions in contaminant concentrations and assess whether any contaminants are migrating offsite.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The facility has used permanent solutions and alternative treatment technologies or resource recovery technologies including the previously completed soil removal action to the maximum extent possible. This final remedy does not satisfy the statutory preference for treatment, but was selected because of the relatively low contaminant concentrations, lack of potential current and future receptors, and the long remedial time frame and high costs associated with treatment of metals at low concentrations.

Because the remedy will result in hazardous substances remaining onsite, it will be reviewed every five years per the requirements of Section 121 of CERCLA to evaluate whether it continues to adequately protect human health and the environment.

ROD Data Certification Checklist

The following checklist certifies that the ROD contains key remedy selection information. Criteria and location within the ROD are listed below.

ROD Criteria	Location
Chemicals of concern and their respective concentrations	Section 5
Baseline risk represented by the chemicals of concern	Section 6.1
Cleanup levels established for chemicals of concern and the basis for these levels	Table 9-1
How source materials constituting principal threats are addressed	Section 9.1
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD	Section 6.1
Potential land and groundwater use that will	Section 9.1

ROD Criteria	Location
be available at the site as a result of the Selected Remedy	
Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimated are projected.	Section 7 and Table 8-1
Key factor(s) that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria)	Section 8

ROD Authorizing Signature

Captain Peter S. Frano, NAS Pensacola — Date: 28 SEP 06

Beverly H. Banister, Acting Division Director
USEPA Division of Waste Management — Date: 10/5/06

1.0 SITE LOCATION AND DESCRIPTION

In December 1989, the Naval Air Station (NAS) Pensacola was placed on the United States Environmental Protection Agency's (USEPA) National Priorities List (NPL) and is listed on USEPA's CERCLA tracking system (CERCLIS FL9170024567). The Federal Facilities Agreement (FFA), signed in October 1990 by USEPA, Florida Department of Environmental Protection (FDEP) and the Navy, outlines the regulatory path to be followed at NAS Pensacola. The Navy is lead agency for NAS Pensacola, while USEPA and FDEP are support agencies.

Operable Unit (OU) 13 is comprised of Sites 8 (Rifle Range Disposal Area) and 24 (DDT Mixing Area), which border the eastern side of John Tower Road and are southeast of the intersection of John Tower and Taylor Roads at NAS Pensacola as shown on Figure 1-1. The site is located in an industrialized portion of NAS Pensacola.

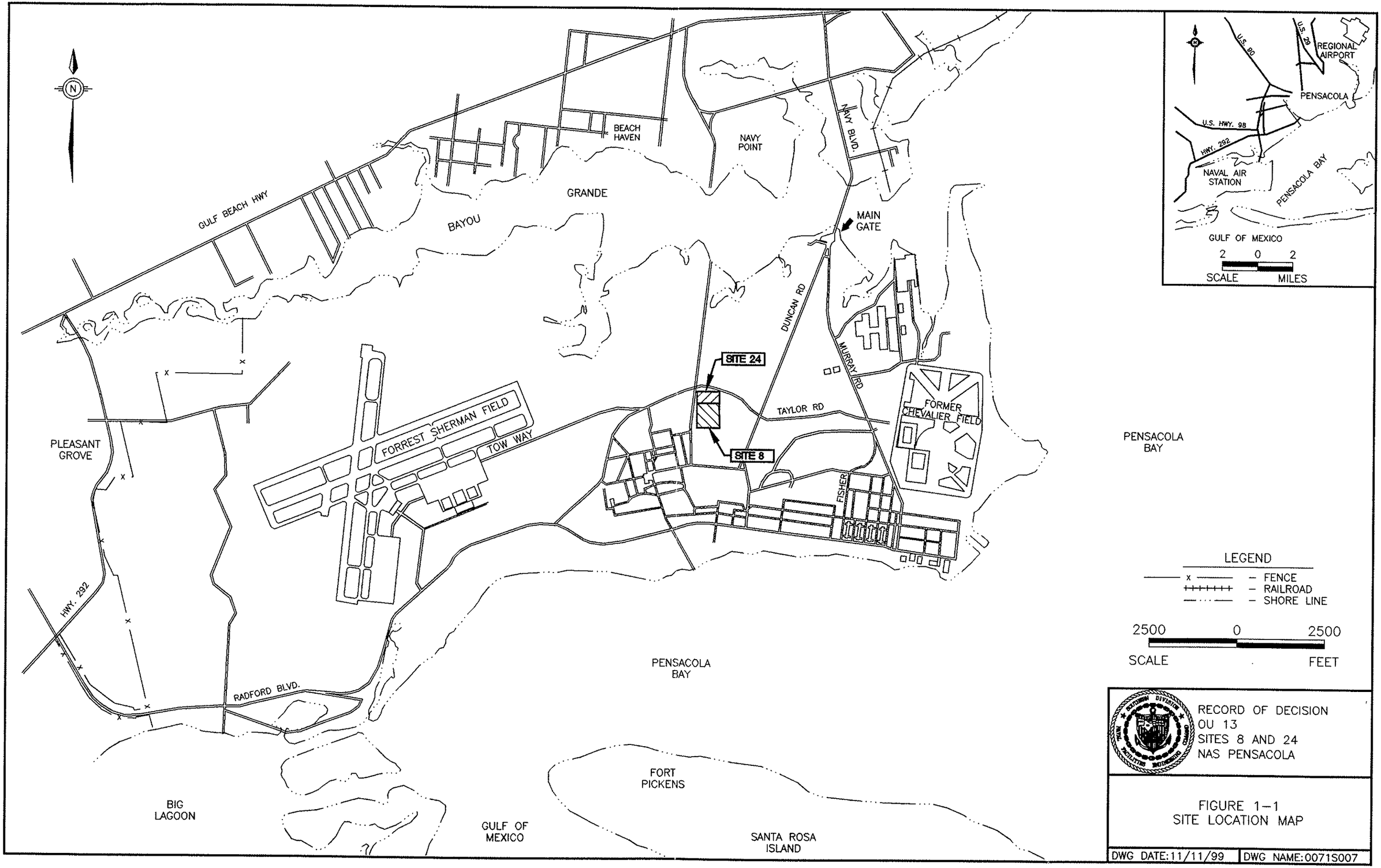
Site 8

Site 8, shown in Figure 1-2, is an approximately 450- by 600-foot area currently occupied by Building 3561, which houses the NAS Pensacola Public Works Center (PWC) Maintenance/Material Department. An extensive asphalt-paved area surrounds Building 3561 to the north, east, and west, covering nearly all land surface. The PWC stores building materials on the paved area west of the building. Site 8 is generally flat with a land surface elevation averaging 29 feet above mean sea level (msl). Miscellaneous office trailers and fenced storage, including Building 3678, are north of the building. The paved area east of the building is used for PWC storage and employee parking. Sidewalks and a grassy median are to the south, between Buildings 3560 and 3561. Although it is not completely shown on the figure, most of Site 8 is surrounded by chain-link fencing. Site use is projected to remain consistent with current use.

Site 24

Site 24, shown in Figure 1-2, is immediately north of Building 3561, near the northwest corner of the Barrancas National Cemetery. The central and northern portions of Site 24 are primarily unpaved and sparsely covered with native grasses and trees. However, the fenced storage area around Building 3678, in Site 24's southern portion, has a gravel/crushed shell land surface. An unimproved dirt road runs west to east across the site's center.

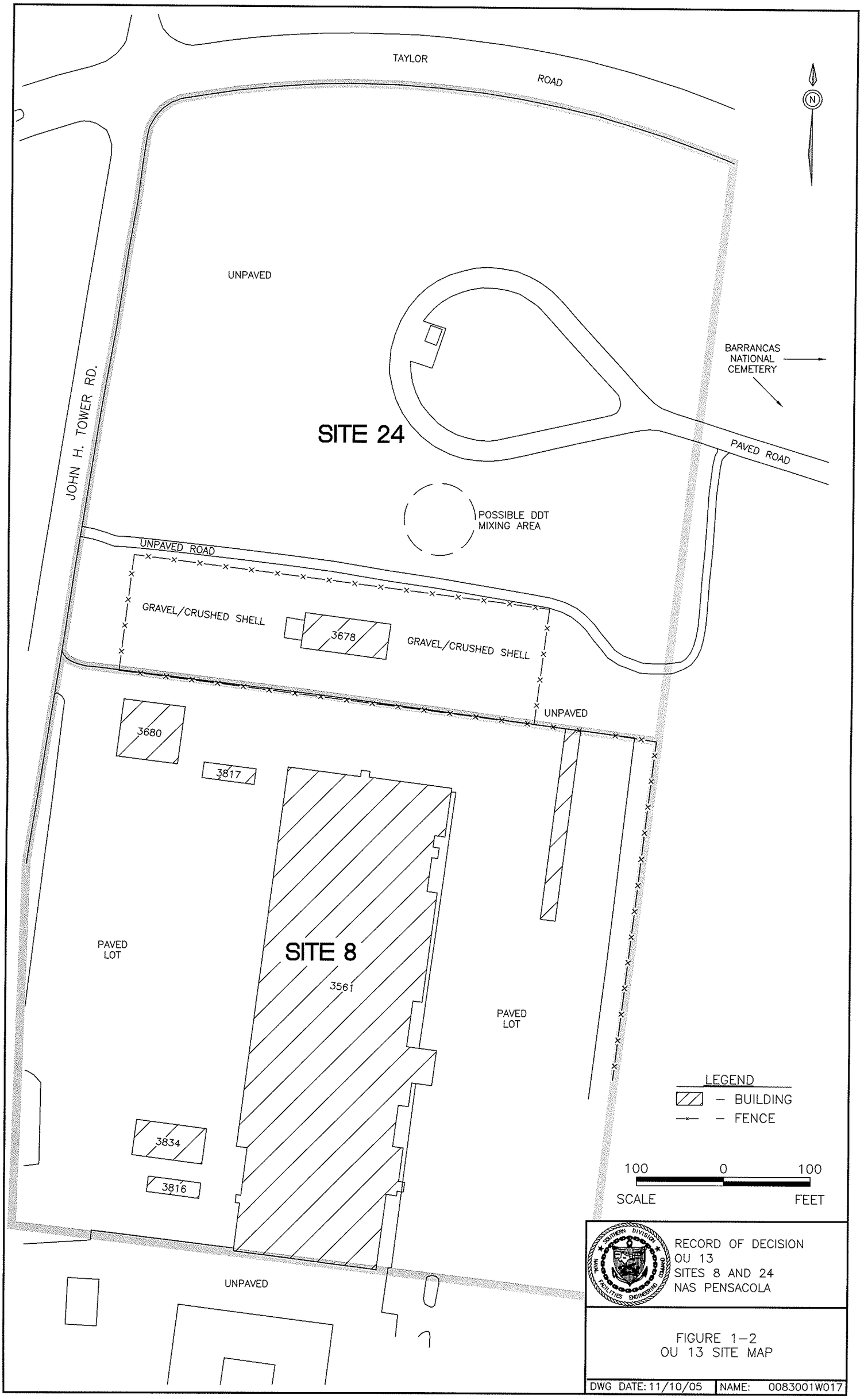
Site 24's soil is primarily sand and, near the surface in some locations, silty clayey sandy fill. The entire site area is generally flat, with land surface elevations approximately 24 to 26 feet above msl. Surface drainage across the site is precluded by the high permeability of the surficial soil which



RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA

FIGURE 1–1
SITE LOCATION MAP

DWG DATE:11/11/99 | DWG NAME:0071S007


TAYLOR ROAD
N
UNPAVED
JOHN H. TOWER RD.
BARRANCAS NATIONAL CEMETERY
SITE 24
PAVED ROAD
POSSIBLE DDT MIXING AREA
UNPAVED ROAD
GRAVEL/CRUSHED SHELL
3678
GRAVEL/CRUSHED SHELL
UNPAVED
3680
3817
PAVED LOT
SITE 8
3561
PAVED LOT
3834
3816
UNPAVED
LEGEND
– BUILDING
– FENCE
100 0 100
SCALE FEET
RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA
FIGURE 1–2
OU 13 SITE MAP
DWG DATE: 11/10/05
NAME: 0083001W017

allows direct, rapid infiltration of precipitation. The site's northern portion is currently part of the Barrancas National Cemetery. The projected future site use continues to be a cemetery.

A water supply well (NAS Pensacola Well No. 1) upgradient of the combined site area approximately 0.3 miles to the southeast. Potable water is obtained from Corry Station, which is approximately 4 miles away from NAS Pensacola. The NAS Pensacola Well No. 1 is screened in the main producing zone beneath the low permeability zone, which separates it from the surficial aquifer. There are several other Installation Restoration Program (IRP) sites nearby. Site 22 (the Refueler Repair Shop) is directly west, across John Tower Road and is now part of the petroleum program, and Site 17 (the Transformer Storage Yard) is approximately 1,300 feet southwest. The southern boundary of Site 1 (the Sanitary Landfill) begins approximately 200 feet northwest of the John Tower/ Taylor Road intersection.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 General Site History

In December 1989, the Naval Air Station (NAS) Pensacola was placed on the United States Environmental Protection Agency's (USEPA) National Priorities List (NPL) and is listed as CERCLIS FL9170024567. The Federal Facilities Agreement (FFA), signed in October 1990, outlined the regulatory path to be followed at NAS Pensacola. NAS Pensacola must complete not only the regulatory obligations associated with its NPL listing, but also must satisfy the ongoing requirements of a State issued Resource Conservation and Recovery Act (RCRA) permit for the treatment, storage, and disposal of hazardous materials and waste and the investigation and remediation of releases of hazardous waste and/or constituents from solid waste management units (SWMUs) at NAS Pensacola. Sites 8 and 24 are listed as SWMUs in the RCRA permit. RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigations and actions are coordinated through the FFA, streamlining the cleanup process. The RCRA permit will be modified to indicate the action taken at OU 13.

2.2 Site-Specific History

Site 8

The base rifle range and disposal area — Site 8 — was reported to be immediately south of Site 24 at the current location of Building 3561. Various solid wastes and dry refuse were reportedly placed in trenches and burned there during the late 1950s and early 1960s. Aerial photographs and maps from the 1950s and 1960s show a rifle range at Building 3561's current location. Earlier aerial photographs show an excavation at the northern end of the rifle range, while later photographs show the excavated area as overgrown with vegetation. Most of the excavation noted in the earlier photographs is currently covered by Building 3561 and surrounding paved area, which were constructed during the mid 1970s. Facility personnel reported no waste or residue identified during the building's construction (Naval Energy and Environmental Support Activity [NEESA], 1983). However, cemetery personnel have reported finding buried metal, rubber, and plastic aircraft parts during excavation along Site 24's eastern boundary (Montgomery, 1996).

Building 3561 was constructed in the mid 1970s and is first visible in aerial photographs from April 1976. During most of the 1980s, a limited portion of Building 3561 was used as a pesticide storage and equipment rinsing area. A tank wash rack rinsing area was constructed in March 1981 midway along Building 3561's eastern side to contain and collect pesticide equipment wash water and rinsate. Wastewater from the wash rack was discharged to the sanitary sewer system. Base

pest control operations were moved from Building 3561 to their current location at Building 1538 in the early 1990s (NEESA, 1983; Pike, 1997).

Other buildings within the Site 8 area include:

- Building 3680, Hazardous Material Storage Building
- Building 3817, Gas Bottle Storage Shed
- Building 3834, Material Storage
- Building 3816, Lumber Storage Shed

Site 24

From the early 1950s until the early 1960s, Site 24 was used to mix DDT with diesel fuel for mosquito control. DDT, reportedly spilled in the mixing area while being transferred from drums to spray tanks, may have contaminated local soil and groundwater. DDT was aerially applied for at least 10 years to control mosquito outbreaks. In later years, DDT was applied by a fogger machine. On the average, two or three mosquito outbreaks occurred each year during the spring and summer. Following each outbreak, DDT was generally applied during a one-week period. For each aerial application, 500 gallons of a 20% DDT solution was mixed with 500 gallons of diesel oil. The fogger machine used 300 gallons of a 20% DDT solution mixed with 300 gallons of diesel fuel. It is estimated that up to 20 gallons of the 20% solution may have been spilled during the approximately 10 years of mixing at the site (NEESA, 1983).

The fenced storage area north of Building 3561 was developed during the mid 1980s. The PWC storage building 3678 inside the fenced area is first visible in a November 1989 photograph.

2.3 Chronology of Events and Previous Investigations

The following chronology of events and previous investigations at OU 13 provides a basis for understanding the history and focus of the remedial investigation/feasibility study (RI/FS) process.

Initial Assessment Study (IAS) — An IAS, completed by NEESA in 1983, evaluated Sites 8 and 24 based on information from historical records, field inspections, and interviews with NAS Pensacola personnel. No evidence of hazardous waste disposal was identified at Site 8. An estimated 20 gallons of pesticide mixture containing 3.3 pounds of DDT was inadvertently spilled during Site 24 operations. According to IAS conclusions, the estimated level of DDT contamination posed

no threat to human health or the environment. As a result, no further study was recommended at either site. No environmental sampling was performed during the IAS.

Ecology and Environment — A Phase I screening investigation of Site 24 was completed by E&E to identify areas and potential contaminants of concern. The investigation results are fully discussed in the Interim Data Report (E&E, 1991). Soil and groundwater samples were collected during the investigation and submitted for laboratory analysis. Lead, total recoverable petroleum hydrocarbons (TRPHs), polynuclear aromatic hydrocarbons (PAHs), and the carbamate pesticide fluometuron were detected in soil. Metals, tetrachloroethene, and the carbamate pesticide methomyl were detected in groundwater. As a result, additional assessment was recommended for Site 24.

EnSafe Inc. — EnSafe Inc. completed an RI/FFS in 1996. Two soil contamination areas were identified beneath the asphalt pavement at Site 8 near sample locations 08S01 and 08S03. Sample 08S01 exhibited cadmium levels of 10.9 mg/kg at 4 to 6 feet bls and 15.9 mg/kg at 7 to 9 feet bls. Both of the samples exceeded the preliminary remediation goal (PRG) applicable during the investigation of 6.0 mg/kg. The PRG was the lower of the USEPA Region 3 preliminary remediation goal or the FDEP cleanup goal. Metals were also compared with their NAS Pensacola reference concentrations. In addition, sample 08S03 exhibited a dieldrin concentration of 2.01 mg/kg in surface soil and 0.49 mg/kg (5 to 7 feet bls) and 0.134 mg/kg (9 to 11 feet bls) in subsurface soil. Each of these samples exceeded their applicable PRG during the investigation of 0.04 mg/kg for surface soil and 0.001 mg/kg for subsurface soil.

CH2M Hill — From 2002 to 2004, CH2M Hill conducted interim removal actions (IRA) at OU 13. The objective of the IRA was to remove contaminated soil at Site 8. Delineation samples were collected and the remedial volume was calculated for the protection of human health and protection of groundwater from leachable contaminants. An estimated area of 1,075 square feet to 10 feet depth was identified at location 08S01 to address cadmium contamination. The volume was approximately 634 cubic yards. Approximately 429 cubic yards of dieldrin contaminated soil was removed in the area of 08S110, west of Building 3561. The Site 8 removal action was conducted from June 28, 2004, to August 25, 2005, and is detailed in the *Interim Removal Action Report, Excavation of Contaminated Soil at Operable Unit 13 Site 8* (CH2M Hill, 2004). The backfill material was analyzed and determined to be clean fill.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Throughout the site's history, the community has been kept abreast of activities in accordance with CERCLA Sections 113(k)(2)(B)(i-v) and 117. In January 1989, a Technical Review Committee (TRC) was formed to review recommendations for investigation and remediation efforts at NAS Pensacola and monitor its progress. The TRC was made up of representatives of the Navy, USEPA, FDER (now FDEP), and the local community. In addition, a mailing list of interested community members and organizations was established and maintained by the NAS Pensacola Public Affairs Office. In July 1995, a Restoration Advisory Board (RAB) was established as a forum for communication between the community and decision-makers. The RAB absorbed the existing TRC and added more members from the community and local organizations. The RAB members work together to monitor progress of the investigation and to review remediation activities and recommendations at NAS Pensacola. RAB meetings are held regularly, advertised, and are open to the public.

Site-related documents were made available to the public in the administrative record at information repositories maintained at the NAS Pensacola Library and the John C. Pace Library of the University of West Florida.

A public notice detailing the removal action was placed in the *Pensacola News Journal* on August 9, 2004. The preferred alternative for OU 13 was presented in the Proposed Remedial Action Plan, also called the Proposed Plan. Everyone on the NAS Pensacola mailing list was sent a copy of the Proposed Plan. The notice of availability of the Proposed Plan was published in the *Pensacola News Journal* on July 3, 2005. A public comment period was held from July 1, 2005, to August 14, 2005, to encourage public participation in the remedy-selection process. In addition, the opportunity for a public meeting was provided. No comments were provided by the public on the preferred alternative.

4.0 SCOPE AND ROLE OF THE OPERABLE UNIT

As with many NPL sites, the problems at NAS Pensacola are complex. As a result, NAS Pensacola was organized into 14 separate operable units. The purpose of each OU is defined in the FY 2005 Site Management Plan (SOUTHNAVFACENGCOM, 2004) for NAS Pensacola, which is in the Administrative Record. Remedies have already been selected and implemented for six OUs. RODs for OU 3 and OU 11 are being completed concurrently with this OU 13 ROD.

This selected remedy is the first and final remedial action for OU 13. The function of this remedy is to reduce the risks to human health and environment associated with exposure to contaminated groundwater. No further action is needed for OU 13 soil to protect human health and environment under a residential scenario.

The selected remedial alternative will address conditions that pose a threat to human health and the environment including:

- Contaminated groundwater that may potentially be used as a potable water source.

Pathways of exposure include:

- ingestion and inhalation of contaminated groundwater

The major components of the remedy are:

- Land use controls imposed to restrict groundwater use of the surficial zone of the Sand-and-Gravel Aquifer onsite.

- Groundwater monitoring in accordance with a Groundwater Monitoring Plan to be developed by the Navy

This remedy addresses the first and final cleanup action planned for OU 13. Although the water-bearing zone is affected, contamination is not affecting any public drinking water supply. Sampling data indicate that there is no current migration of contaminants offsite. This proposed action is intended to prevent current or future unacceptable exposure to contaminated groundwater, and to ensure that groundwater contaminants are detected and addressed as necessary if found to be migrating offsite.

5.0 SITE CHARACTERISTICS

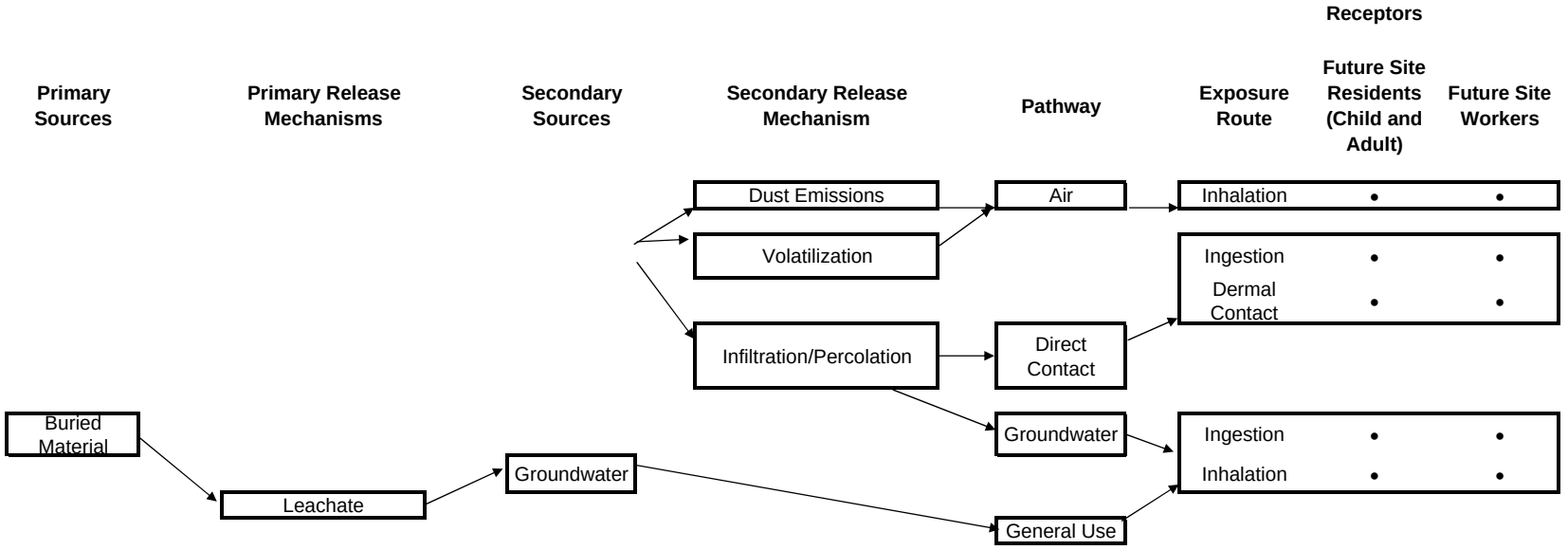
This section of the ROD presents an overview of the site conditions encountered, nature and extent of contamination at OU 13 with respect to known or suspected sources of contamination, types of contamination, and affected media. Known or potential routes of contaminant migration are also discussed. A site conceptual model based on data and information collected during the RI is presented in Figure 5-1.

5.1 Site-Specific Stratigraphy

Surface soil (0 to 1 foot below land surface [bls]) across OU 13 generally consisted of either red silty, clayey sand road base material immediately beneath the asphalt pavement, or light to dark brown silty sandy loam with decayed organics and root traces at unpaved locations. Beneath this material, subsurface lithologies observed across the site during drilling generally consisted of buff white to tan and light gray to brown, fine- to medium-grained quartz sand containing varying, but relatively small, amounts of silt-sized material. However, once saturated by groundwater, site soil commonly changed to dark brown or gray. A relatively thick capillary fringe was noted in the site area. Across this fringe, soil moisture steadily increased to full saturation over an approximate 2-foot interval. Water level elevations varied significantly (more than 2 feet) during the investigation depending upon recent rainfall amounts and seasonal effects. The depth-to-water observed during drilling and soil sampling varied from approximately 5.5 feet bls along Site 24's western portion (well location 24GS01) to approximately 8.5 feet bls at its southern portion (wells 24GS04 and 24GS05). At Site 8, the depth-to-water during drilling was approximately 8 feet bls across most of the site, except at northeastern-most well 08GR07, where water was encountered at approximately 11 feet bls.

The only significant subsurface anomalies noted during boring completion were fragments of plastic, metal/slag, and glass debris, which were intermixed with the native sandy soil and appeared charred at some locations. This debris was encountered on both sites at the following locations: boring 24S14 (5 feet bls); a location north of Building 3678 and immediately south of the adjacent unpaved road (3 feet bls); boring 08S06 (5 feet bls); and boring 08S07 (6 feet bls). The presence of the debris is consistent with Site 8's past use as a disposal area. Materials found at Site 24 are believed to be from Site 8 disposal activities; extensive earthwork performed to construct Building 3561 is likely the cause of materials found in Site 24 soils.

Figure 5-1 Conceptual Site Model



5.2 Surface Water Movement and Site Drainage

Sites 8 and 24 lie within a developed area of the base. They do not contain, nor are they adjacent to, any surface water bodies or wetlands. Site 24's soil is primarily sand and, near the surface in some locations, silty clayey sandy fill. The entire site area is generally flat, with land surface elevations approximately 24 to 26 feet above msl. Surface drainage across the site is precluded by the high permeability of the surficial soil, which allows direct, rapid infiltration of precipitation. However, the extensive pavement at Site 8 inhibits percolation of direct rainfall through site soil. Rainwater from Site 8 tends to run onto adjacent unpaved surfaces where it infiltrates.

5.3 Site-Specific Hydrogeology

Initially, sixteen groundwater monitoring wells were set within OU 13 to delineate plumes and groundwater flow direction. To further evaluate the downgradient extent of contaminants of potential concern in groundwater, six additional shallow groundwater monitoring wells were installed and sampled in March 1999 as part of the RI Addendum. All monitoring wells were screened in the shallow groundwater aquifer, with the deepest screened interval being 13.1 to 18.1 feet (ft) bls. For more extensive discussions regarding NAS Pensacola hydrogeology, the reader is referred to the RI.

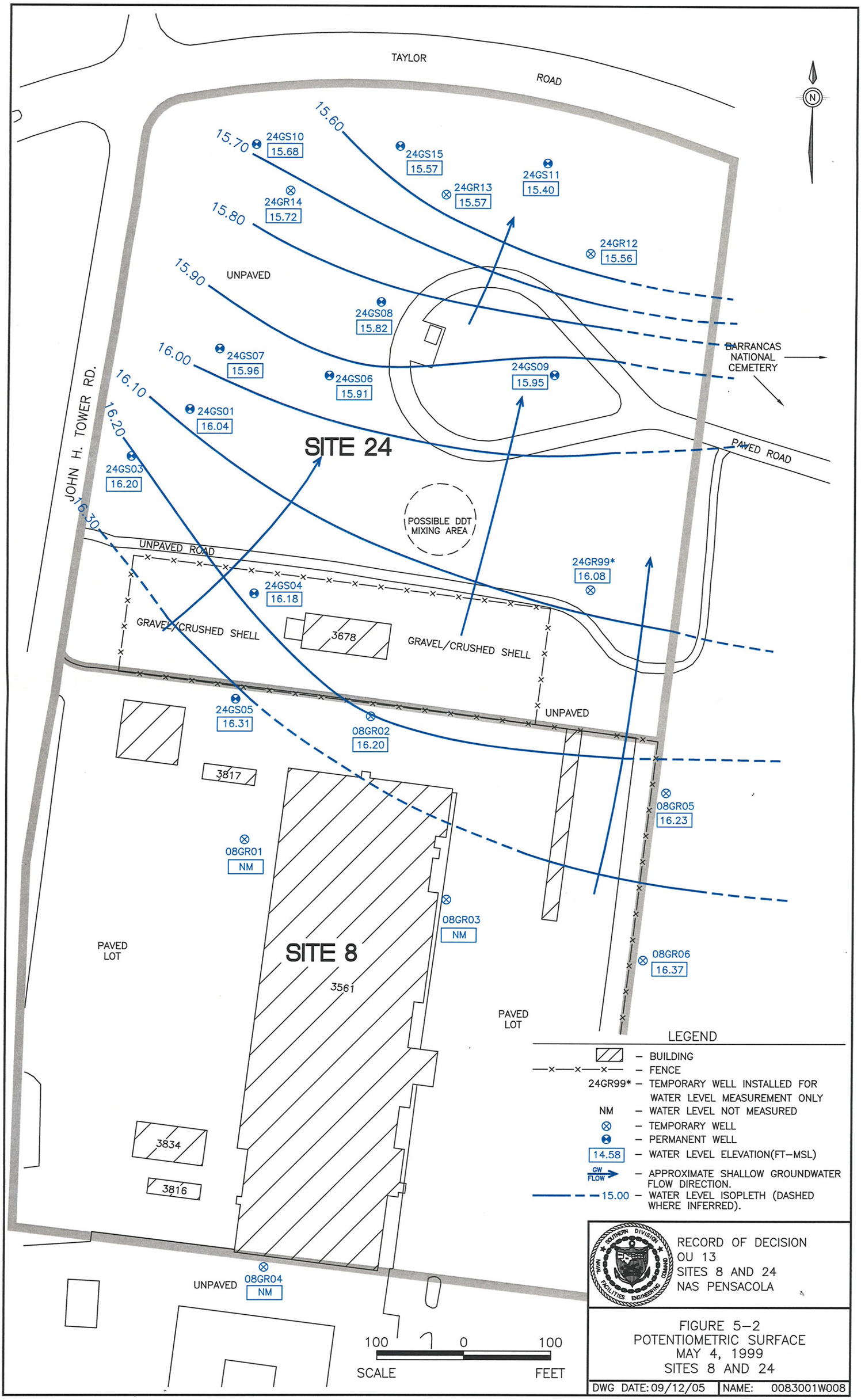
Water Level Elevations and Groundwater Flow

Water-level data for three separate groundwater level sampling events and well construction information for both sites are listed on Table 5-1. Figure 5-2 presents the potentiometric surface for OU 13 from measurements collected on May 4, 1999. Overall, this flow regime generally mimics the local topography, sloping slightly north-northeast across the area. The average hydraulic gradient across the area is relatively flat (0.0017).

Specific Capacity Test Results

Specific capacity tests were performed on two Site 24 monitoring wells. These tests followed well development and groundwater sampling. Results are listed in Table 5-2.

Using the data from Table 5-2, the geometric mean for hydraulic conductivity was calculated for site wells. The geometric mean is considered the most representative value of the central tendency of these data, because hydrologic conductivity data are generally log normally distributed. The



RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA

FIGURE 5–2
POTENTIOMETRIC SURFACE
MAY 4, 1999
SITES 8 AND 24

DWG DATE: 09/12/05 | NAME: 0083001W008

Table 5-1

Monitoring Well Construction Information and Water Level Elevations [a]

OU 13 (Sites 8 and 24)

Monitoring Well ID[b]	Total Well Depth (ft) (BTOC)	Screened Interval (ft) (BTOC)	Top of Casing Elevation[a]	Depth to Water (ft) (BTOC)				Groundwater Elevation[a]			
				10/3/1995	5/24/1996	8/30/1996	5/4/1999	10/3/1995	5/24/1996	8/30/1996	5/4/1999
24GS01	14.1	3.6-13.6	23.81	6.23	6.7	8.97	7.77	17.58	17.11	14.84	16.04
24GS02	15.25	4.75-14.75	25.51	7.94	8.46	10.75	—	17.57	17.05	14.76	—
24GS03	14.4	3.9-13.9	24.45	6.78	7.27	9.52	8.25	17.67	17.18	14.93	16.2
24GS04	17.1	6.6-16.6	27.01	9.21	9.79	11.98	10.83	17.8	17.22	15.03	16.18
24GS05	17.2	6.7-16.7	27.79	9.84	10.44	12.61	11.48	17.95	17.35	15.18	16.31
24GS06	14.15	3.65-13.65	25.36	7.86	8.37	10.48	9.45	17.5	16.99	14.88*	15.91
24GS07	15.25	4.75-14.75	25.21	—	8.19	10.67	9.25	—	17.02	14.54	15.96
24GS08	14.5	4.0-14.0	26.63	—	9.73	12.05	10.81	—	16.9	14.58	15.82
24GS09	18.6	8.1-18.1	27.6	—	—	12.89	11.65	—	—	14.71	15.95
24GS10	17	6.5-16.5	25.35	—	—	—	9.67	—	—	—	15.68
24GS11	17	6.5-16.5	24.31	—	—	—	8.91	—	—	—	15.4
24GR12	17	6.5-16.5	28.6	—	—	—	13.04	—	—	—	15.56
24GR13	17	6.5-16.5	27.96	—	—	—	12.39	—	—	—	15.57
24GR14	17	6.5-16.5	28.25	—	—	—	12.53	—	—	—	15.72
24GS15	17	6.5-16.5	24.19	—	—	—	8.56	—	—	—	15.57
24GR99[c]	9.5	4.0-9.0	27.24	—	—	—	11.16	—	—	—	16.08
08GR01	15.4	10.4-15.4	27.99	—	—	12.61	CD	—	—	15.38	CD
08GR02	15.45	10.45-15.45	28.52								
28.08[d]	—	—	13.33	11.88	—	—	15.19	16.2			
08GR03	15.37	10.37-15.37	28.17	—	—	12.9	CD	—	—	15.27	CD
08GR04	18.14	13.14-18.14	30.51	—	—	14.67	—	—	—	15.84	—
08GR05	15.4	10.40-15.40	28.25								
26.67[d]	—	—	13.34	10.44	—	—	14.91	16.23			
08GR06	15.45	10.45-15.45	28.33								
27.75[d]	—	—	13.23	11.38	—	—	15.1	16.37			
08GR07	13	3.0-13.000	NM	—	—	11.20**	11.16	—	—	ND	16.08

Notes:

a = All elevations measured in feet above msl.

b = GS label assigned to permanent wells; GR lavel assigned to temporary wells.

c = Temporary well point installed by hand to determine water level elevation only.

d = Top of casing re-surveyed since original Ri due to damage to aboveground casing.

*Water level suspect; not considered in piezometric surface construction.

**Water level measured April 2, 1997 during Phase II groundwater sampling.

CD = Well casing destroyed; water level not measured.

NM = Not measured

ND = Not determined

BTOC = Below top of well casing.

24GS02 abandoned during RI Addendum due to Barrancas National Cemetery expansion.

range of hydraulic conductivity is 30.64 to 38.95 feet per day (ft/day); the geometric mean is 34.55 ft/day.

Table 5-2
Specific Capacity Test Results

Well ID	Well Depth (ft) (BTOC)	Specific Capacity (gpm/ft)	Transmissivity (Ft^2/day)	Hydraulic Conductivity (ft/day)
024GS02	15.25	2.87	1168.78	38.96
024GS03	14.40	2.29	919.38	30.65

Notes:
BTOC = below top of casing
gpm = gallons per minute
Ft = feet

Groundwater Velocity Estimate

Groundwater velocity was estimated for OU 13 using Darcy's law. This estimate is based on the combined site area's 0.0017 shallow groundwater gradient, the calculated geometric mean hydraulic conductivity of 34.55 ft/day, and an effective porosity estimate of 35% for unconsolidated fine- to medium-grained sand. Estimated average horizontal pore velocities for shallow groundwater flow, calculated for the combined site area, are approximately 0.17 ft/day.

5.4 Nature and Extent of Contamination

To evaluate nature and extent of contamination at OU 13, the concentration of each detected compound was compared to FDEP's residential and industrial soil cleanup target levels (SCTLs) in Rule 62-777. Subsurface soil was compared against FDEP SCTLs in Rule 62-777 for the protection of groundwater. Groundwater was compared to USEPA primary and secondary maximum contaminant levels (MCLs and SMCLs, respectively) and Florida Groundwater Cleanup Target Levels (GCTLs) in Rule 62-777. In addition, detected inorganic concentrations for soil and groundwater were compared to site reference concentrations (RCs) that were developed specifically for NAS Pensacola. If detected concentrations are below the RC, they are considered to be naturally occurring. The initial screening comparison performed during the RI is a qualitative assessment of the data to identify areas of concern (hot spots) and to identify compounds which may have been released onsite. This is not a quantitative assessment of site risk, which is summarized in Section 6.

Soil

The cadmium (08S01) and dieldrin (08S03) contaminated areas were removed in 2004. Remaining concentrations are generally below the current residential SCTLs. Only one metal, arsenic, exceeds its SCTL (2.1 mg/kg) at three locations. Concentrations range from 2.2 ppm at 24S15 to 3.1 ppm

at 24S11 in the surface soil interval. Metals detected in OU 13 soil exceeding cleanup criteria are presented in Figure 5-3.

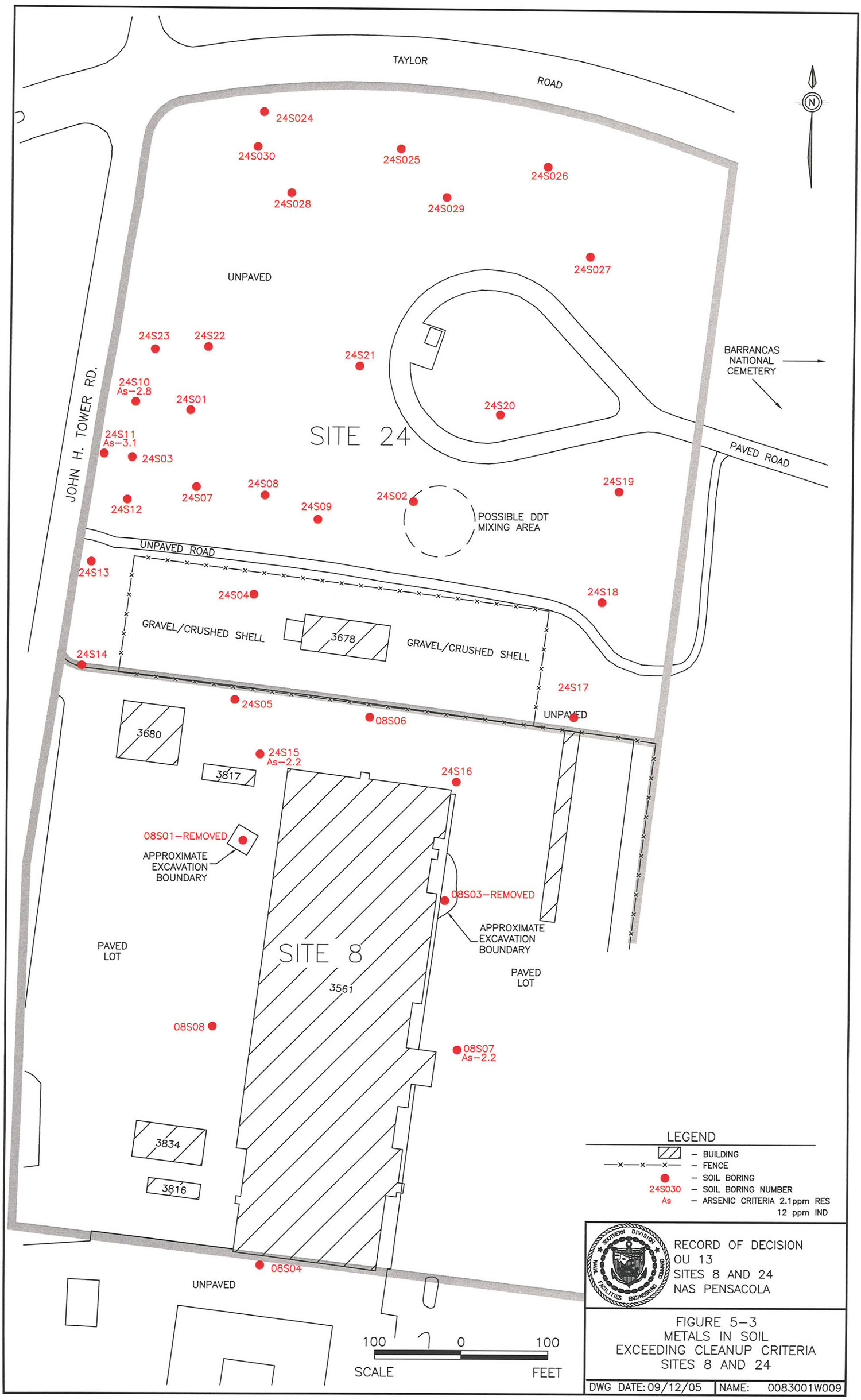
All pesticide soil exceedances of residential criteria remaining after the soil removal actions were detected in samples from the site's northern portion. Corresponding subsurface soil contamination above dieldrin and aldrin protection of groundwater SCTLs were detected at this location; concentrations decreased with depth. Pesticide concentrations exceeding residential cleanup criteria at OU 13 are presented in Figure 5-4. As described in CH2M Hill's memorandum *Evaluation of Site Conditions Based on Results of Soil and Groundwater Sampling, NAS Pensacola, Operable Unit 13, Site 24,* the concentrations detected in the area are attributed to routine application and are not indicative of a spill. Therefore, no additional action is needed for this area.

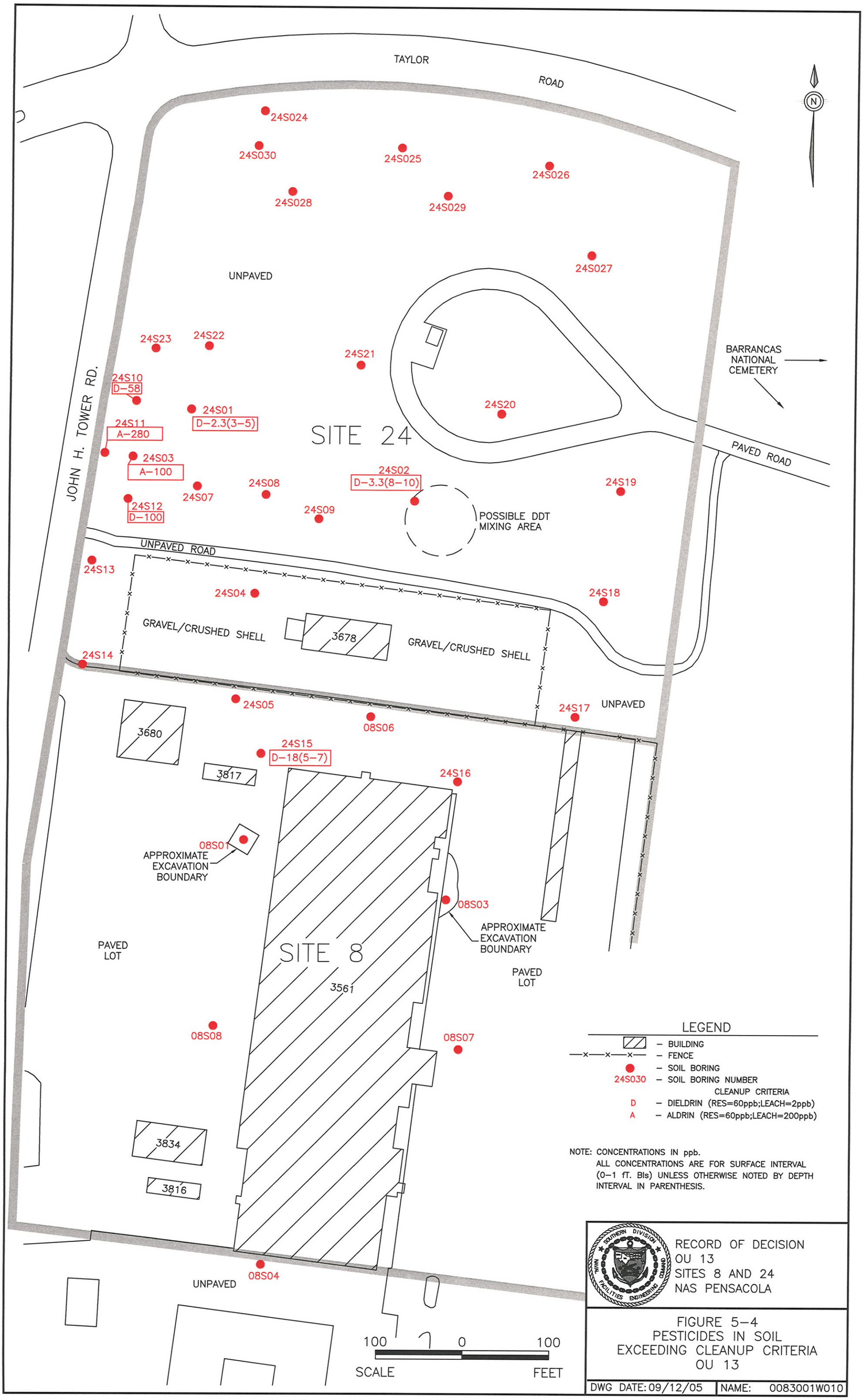
The few polynuclear aromatic hydrocarbon exceedances are suspected to be the result of past waste oil application for dust control along the previously unpaved John Tower Road and/or residuals from vehicle traffic along the road. Semivolatile organic compounds (SVOCs) concentrations exceeding residential cleanup criteria at OU 13 are presented in Figure 5-5.

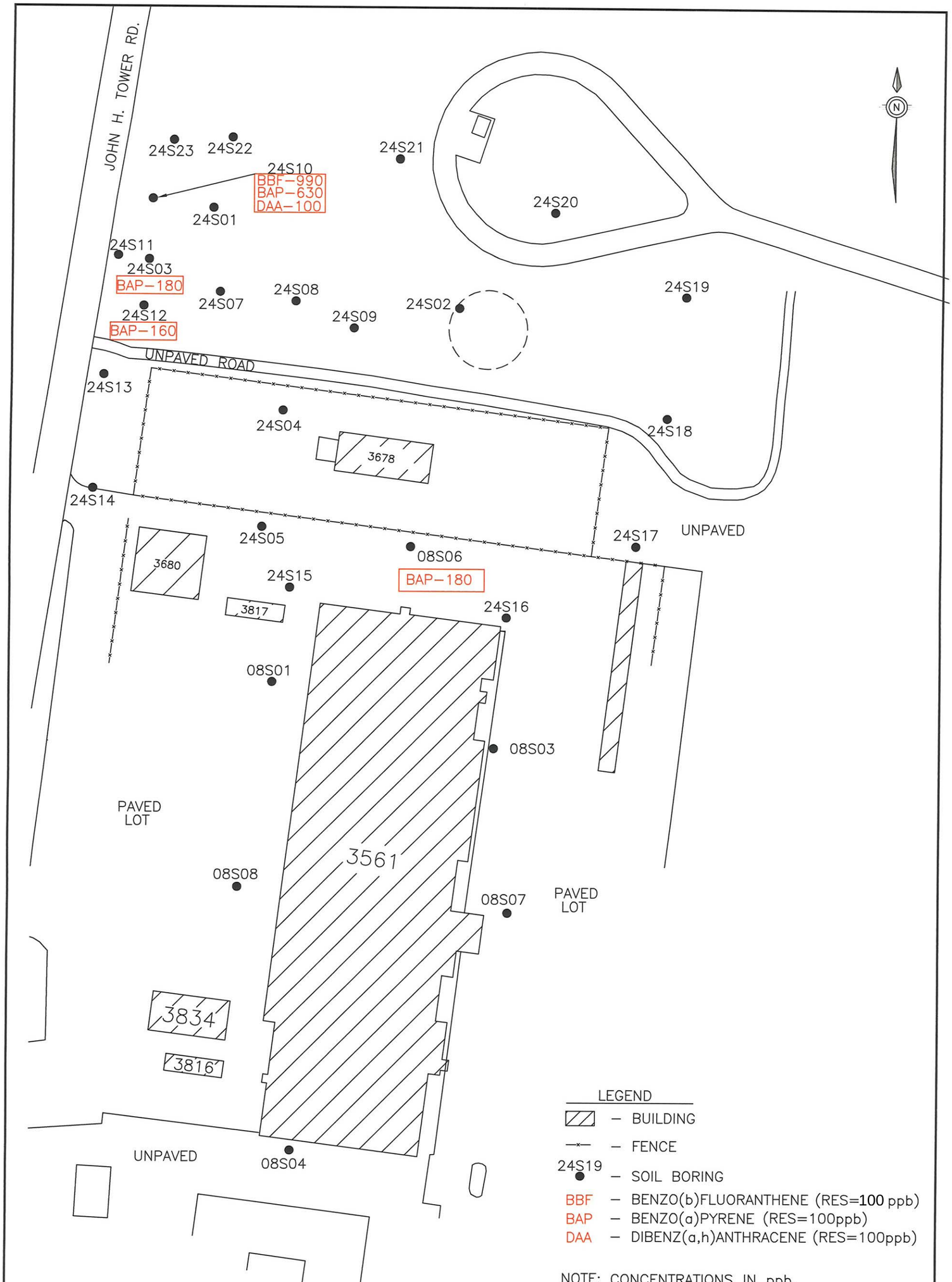
No polychlorinated biphenyls (PCBs) were detected above residential cleanup criteria at Site 8. No volatile organic compounds (VOCs) were detected in Site 8 soil above residential cleanup criteria.

Groundwater — Site 8

Only cadmium, manganese, and an isolated lead detection exceeded both cleanup criteria and RCs in Site 8 groundwater. Antimony exceeded its cleanup criteria in two samples; there is no RC for antimony. Except for the one antimony detection, all exceedances occurred in samples collected from the site's north and northeast portion, extending toward the cemetery. This distribution is consistent with past disposal of metallic-alloy aircraft refuse or other metallic material that may lie beneath Building 3561's current location and the site's northern shallow groundwater flow. The extent of shallow groundwater impact does not extend to Site 8's farthest downgradient well, 08GR07, as confirmed by no inorganic exceedances found in the Phase II sample from that location. No organic cleanup criteria exceedances were detected in Site 8 groundwater samples. Inorganic exceedances in groundwater at OU 13 are presented in Figure 5-6. No PCBs, SVOCs or VOCs were detected above cleanup criteria in Site 8 groundwater.


TAYLOR ROAD
JOHN H. TOWER RD.
BARRANCAS NATIONAL CEMETERY
PAVED ROAD
UNPAVED
SITE 24
SITE 8
24S024
24S030
24S025
24S026
24S028
24S029
24S027
24S23
24S22
24S21
24S10 As–2.8
24S01
24S20
24S11 As–3.1
24S03
24S08
24S19
24S07
24S02
24S12
24S09
POSSIBLE DDT MIXING AREA
UNPAVED ROAD
24S13
24S04
24S18
GRAVEL/CRUSHED SHELL
3678
GRAVEL/CRUSHED SHELL
24S14
24S17
24S05
08S06
UNPAVED
3680
24S15 As–2.2
3817
24S16
08S01–REMOVED
APPROXIMATE EXCAVATION BOUNDARY
08S03–REMOVED
APPROXIMATE EXCAVATION BOUNDARY
PAVED LOT
3561
PAVED LOT
08S08
08S07 As–2.2
3834
3816
08S04
UNPAVED
100 0 100
SCALE FEET
LEGEND
– BUILDING
– FENCE
– SOIL BORING
24S030 – SOIL BORING NUMBER
As – ARSENIC CRITERIA 2.1ppm RES
12 ppm IND
RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA
FIGURE 5–3
METALS IN SOIL
EXCEEDING CLEANUP CRITERIA
SITES 8 AND 24
DWG DATE: 09/12/05
NAME: 0083001W009

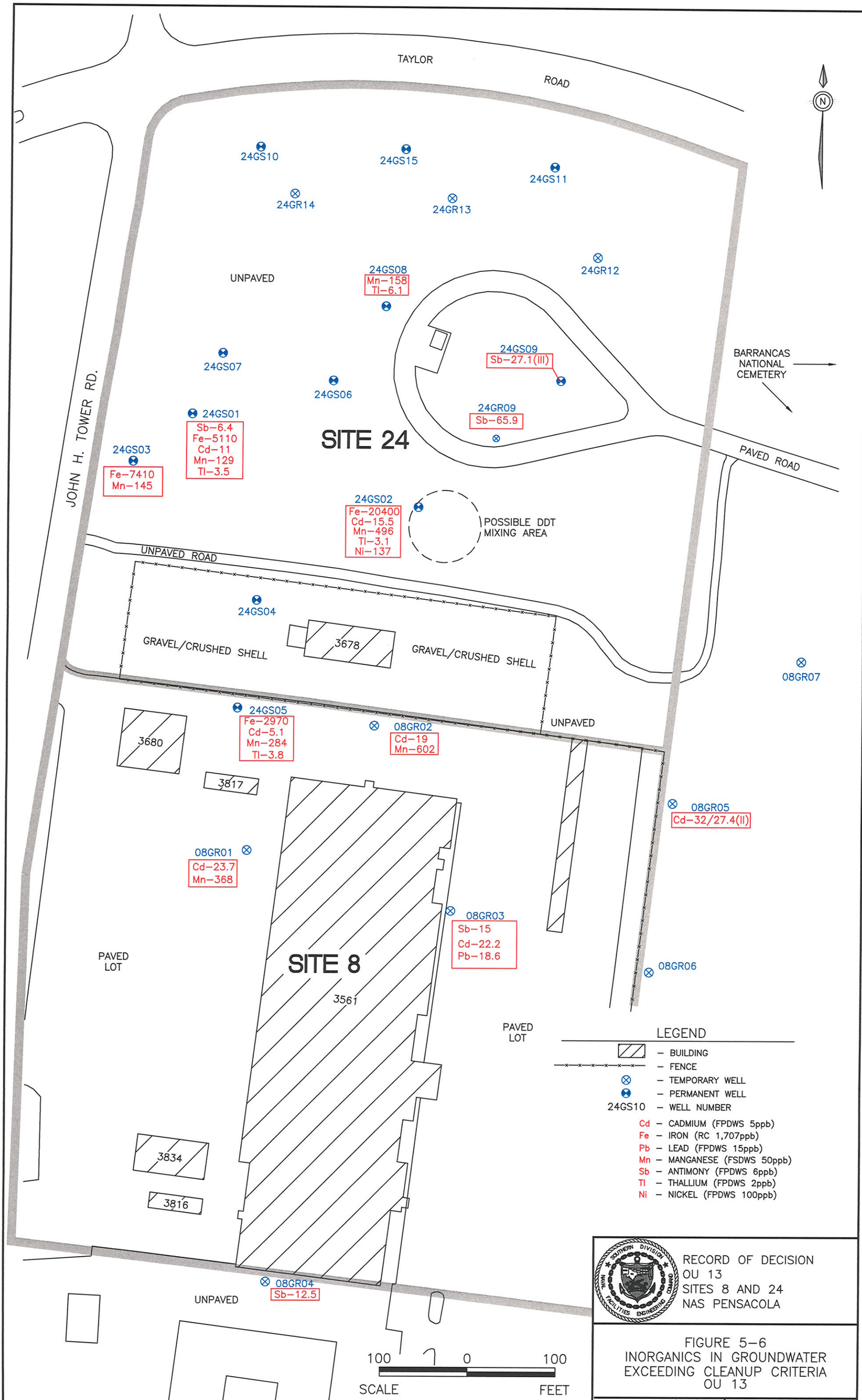

TAYLOR ROAD
JOHN H. TOWER RD.
BARRANCAS NATIONAL CEMETERY
PAVED ROAD
UNPAVED
SITE 24
SITE 8
24S024
24S030
24S025
24S026
24S028
24S029
24S027
24S023
24S022
24S021
24S10 D-58
24S01 D-2.3(3-5)
24S11 A-280
24S03 A-100
24S02 D-3.3(8-10)
24S08
24S07
24S19
24S12 D-100
24S09
POSSIBLE DDT MIXING AREA
UNPAVED ROAD
24S13
24S04
24S18
GRAVEL/CRUSHED SHELL
3678
GRAVEL/CRUSHED SHELL
24S14
24S05
08S06
24S17
UNPAVED
3680
24S15 D-18(5-7)
3817
24S16
08S01
APPROXIMATE EXCAVATION BOUNDARY
08S03
APPROXIMATE EXCAVATION BOUNDARY
PAVED LOT
3561
PAVED LOT
08S08
08S07
3834
3816
08S04
UNPAVED
100 0 100
SCALE FEET
LEGEND
BUILDING
FENCE
SOIL BORING
24S030 – SOIL BORING NUMBER
CLEANUP CRITERIA
D – DIELDRIN (RES=60ppb;LEACH=2ppb)
A – ALDRIN (RES=60ppb;LEACH=200ppb)
NOTE: CONCENTRATIONS IN ppb.
ALL CONCENTRATIONS ARE FOR SURFACE INTERVAL (0–1 fT. Bls) UNLESS OTHERWISE NOTED BY DEPTH INTERVAL IN PARENTHESIS.
RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA
FIGURE 5–4
PESTICIDES IN SOIL
EXCEEDING CLEANUP CRITERIA
OU 13
DWG DATE: 09/12/05
NAME: 0083001W010



RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA

FIGURE 5–5
SVOCs IN
SOIL EXCEEDING CLEANUP CRITERIA
OU 13

DWG DATE: 09/12/05 | NAME: 0083001W011



RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA

FIGURE 5–6
INORGANICS IN GROUNDWATER
EXCEEDING CLEANUP CRITERIA
OU 13

DWG DATE: 09/12/05 | NAME: 0083001W012

Groundwater — Site 24

Cleanup criteria and RC exceedances of iron and manganese detected in shallow groundwater at Site 24 can be attributed to fertilizer application, which commonly contains water-soluble forms of these inorganics as essential nutrients. Metal fragments were found in the subsurface soil north of Building 3678, indicating that Site 8 fill activities extended to, or have been reworked onto Site 24. Based on this evidence, sporadic antimony, cadmium, nickel, and thallium exceedances in shallow groundwater are attributed to metal-alloy debris disposal at Site 8 and/or 24. In the RI Addendum investigation, aluminum, calcium, iron, magnesium, and sodium concentrations exceeded cleanup criteria or RCs. Inorganics exceeding cleanup criteria and RCs in groundwater are shown in Figure 5-6.

Relatively low concentrations of methylene chloride (MC) in 24GS06, and trichloroethene (TCE) and vinyl chloride (VC) in 24GS02 slightly exceeded their cleanup criteria, and are also suspected to be the result of past disposal activities at Site 8 and/or 24. Detections below cleanup criteria for tetrachloroethene (3 ppb) and dichloroethene (2 ppb) were identified in 24GS04 and 24GSO5, which are directly upgradient of 24GS02. VOC exceedances in groundwater at OU 13 are presented in Figure 5-7.

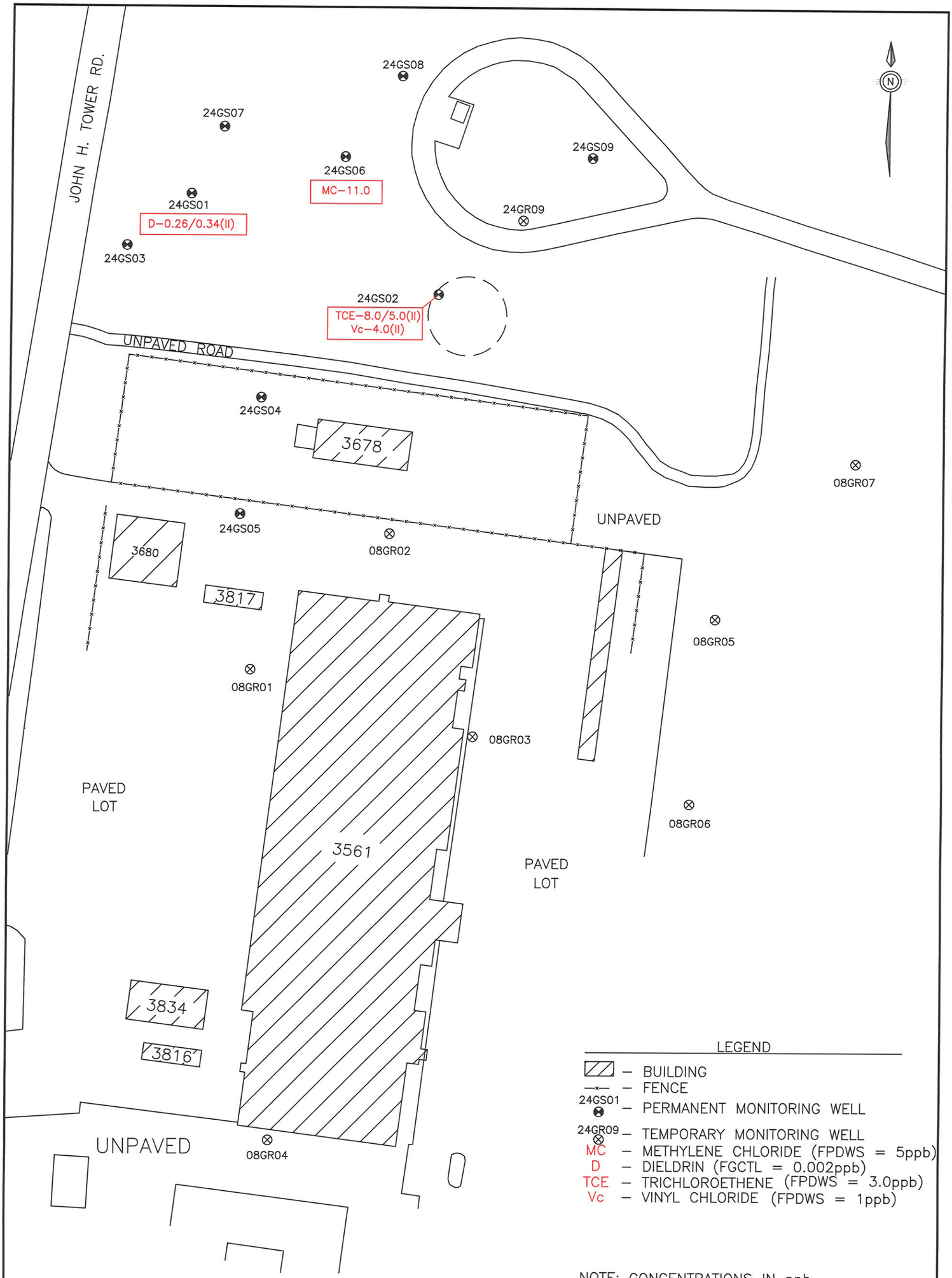
A single dieldrin groundwater exceedance at 24GS01, which corresponds to soil sample exceedances at 24S01, 24S10, and 24S12, indicates that soil concentrations have leached to groundwater in a limited area. No other exceedances were detected; however, dieldrin was detected below its cleanup criteria in 24GS03 at 0.031 ppb and 24GS07 at 0.0027 ppb, both north and south of 24GS01. In addition, a dieldrin detection below its cleanup criteria was noted at 24GS04. No pesticides were detected in the six downgradient wells installed and sampled in the RI Addendum investigation. Pesticide exceedances in groundwater at OU 13 are presented in Figure 5-7. No SVOCs or PCBs were detected above cleanup criteria in Site 24 groundwater.

5.5 Fate and Transport

Fate and transport assessment evaluates the ability of contaminants to become mobile or change in the environment, based on their chemical and physical properties and on processes that govern the interaction of the constituents with environmental media.

5.5.1 Migration Pathways

The presence of the same contaminant in both source and receptor media indicates contaminant transport. Likewise, soil contaminant concentrations exceeding typical leachability screening levels,



LEGEND

- ▨ – BUILDING
- —×— – FENCE
- 24GS01 ⊗ – PERMANENT MONITORING WELL
- 24GR09 ⊗ – TEMPORARY MONITORING WELL
- MC – METHYLENE CHLORIDE (FPDWS = 5ppb)
- D – DIELDRIN (FGCTL = 0.002ppb)
- TCE – TRICHLOROETHENE (FPDWS = 3.0ppb)
- Vc – VINYL CHLORIDE (FPDWS = 1ppb)

NOTE: CONCENTRATIONS IN ppb.
ALL CONCENTRATIONS ARE FOR PHASE I SAMPLES UNLESS NOTED OTHERWISE BY (II) IN PARENTHESIS.

100 0 100
SCALE FEET

RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA

FIGURE 5–7
PESTICIDES AND VOCs EXCEEDING CLEANUP CRITERIA IN GROUNDWATER
OU 13

DWG DATE: 09/12/05 | NAME: 0083001W013

or groundwater contaminants exceeding applicable cleanup criteria, indicate the potential for future contaminant transport and impact on receptors. This section discusses possible pathways for contaminant transport at each site.

Site 8 land surface is generally level and asphalt-paved; Site 24 land surface is generally level and unpaved. Site 24 surface soil is highly permeable sand with grassy cover. Precipitation falling on unpaved surfaces infiltrates the sandy soil and percolates into the unconfined surficial zone, which is the uppermost unit of the regional Sand-and-Gravel Aquifer. Groundwater moves from the south to the north-northeast across the combined site area, toward Bayou Grande and associated tidal ponds approximately 3,500 feet to the north. After evaluating Sites 8 and 24 for the constituent and media properties and for the hydrogeologic characteristics, the RI identified three potential routes of constituent migration for further discussion:

- Leaching of constituents from soil to groundwater (no longer valid because of the post RI removal action)

- Transport of constituents in groundwater

- Air emissions resulting from VOCs and particulates released from surface soil (Site 24 only)

Table 5-3 summarizes the chemical and physical parameters of Site 8 and 24 soil, or those of comparable soil from other portions of NAS Pensacola, used to evaluate fate and transport. Typical bulk density and porosity values reported for surficial soil at NAS Pensacola are 92.09 pounds per cubic foot (lbs/ft3) and 44.22%, respectively. These values are consistent with a fine- to medium-grained sandy soil containing significant interconnected void space. The average cation exchange capacity (CEC) for Site 24 soil is 0.45 milliequivalent per 100 grams (mEq/100g), with results ranging from 0.34 to 0.56. This value indicates an environment of relatively low electromagnetic attraction between site soil and detected constituents, particularly inorganics. The average pH (measured during sample preparation) of soil across Site 24 is 7.8 units, indicating a relatively neutral environment that does not particularly promote the mobility or precipitation of inorganics, or the molecular substitution or degradation of organic compounds. The average total organic carbon (TOC) concentration for Site 24 soil is 1,185 mg/kg, with a range of 370 mg/kg to 2,000 mg/kg. This indicates a relatively low soil organic content that moderately inhibits the movement of contaminants, particularly those with high Koc values, due to soil adsorption.

Table 5-3
Soil Parameters Used to Evaluate Fate and Transport

Parameter	Minimum Value	Maximum Value	Average Value	Units
Cation Exchange Capacity	0.34	0.56	0.45	(mEq/100g)
Total Organic Carbon	370	2000	1185	(mg/kg)
pH a	6.1	8.5	7.8	(pH units)
Total Porosity[b]	44.22	44.22	—	(percent)
Bulk Density[b]	92.09	92.09	—	(lbs/ft^3)

Notes:
a = pH values compiled from surface and subsurface soil analysis prescreening by the laboratory.
b = Total porosity and bulk density values based on analysis of a shallow zone undisturbed soil (Shelby tube) sample from NAS Pensacola Site 15.
lbs/ft^3 = Pounds per cubic foot

5.5.2 Leaching from Soil to Groundwater

The IRA conducted in 2004 has eliminated this pathway of migration.

5.5.3 Groundwater Transport

Shallow groundwater moves generally north-northeastward across the combined Sites 8 and 24 area, as shown on Figure 5-2. Shallow groundwater from portions of NAS Pensacola containing Sites 8 and 24 flows northward and ultimately discharges to Bayou Grande and several associated tidal ponds/wetlands, approximately 3,500 feet north of Site 24. The site's flow regime occurs under a consistently low hydraulic gradient of 0.0017. The average shallow groundwater horizontal pore velocity calculated for the site area in the RI was 0.17 ft/day.

As previously discussed, groundwater pH can affect the migration of groundwater entrained contaminants. Typical shallow groundwater pH across the site area ranged from 5.5 to 6.5 units. This indicates the shallow groundwater zone is neutral to only slightly acidic. Under these conditions, inorganics tend to be relatively immobile, and organics relatively stable.

Cadmium was the most prevalent inorganic cleanup criteria and RC exceedance detected in Site 8 groundwater; antimony, iron, and manganese were the most prevalent at Site 24. Due to the complexities of inorganic parameter fate and transport processes, sufficient data are not available to calculate a representative transport rate for these parameters. However, the spatial distribution of these exceedances in groundwater indicates elevated cadmium concentrations do not extend beyond Site 8's northeastern boundary, and elevated antimony does not extend beyond Site 24's

northeastern boundary (i.e., appreciable inorganic parameter transport is not occurring in groundwater; concentrations exceeding cleanup criteria and RCs do not extend to the sites' most downgradient well locations, 08GR07, 24GS11, and 24GS15, respectively). Iron and manganese in Site 24 groundwater, attributable to the routine fertilizing of the cemetery grounds, is generally widespread.

No organic cleanup criteria exceedances were detected in Site 8 groundwater. Dieldrin (only a slight exceedance at a single location) and the VOCs methylene chloride, trichloroethene, and vinyl chloride were detected in Site 24 groundwater. Given the physical soil properties determined from laboratory analysis, an estimated Rf may be calculated for each parameter. When combined with the horizontal groundwater velocity, an approximate travel time for these organics in shallow groundwater can be determined to illustrate the magnitude of the sorption process occurring during transport. Using the literature-derived Koc values for these compounds, and the soil's average TOC of 1,185 mg/kg, calculated site-specific Kd values for each compound are as follows (see Section 8.2.2 of the RI for this equation):

Parameter	**Kd (in L/kg)**
Dieldrin	15.88
Methylene Chloride	0.01
Trichloroethene	0.15
Vinyl Chloride	0.07

Given a soil bulk density value of 92.09 lbs/ft3, and effective porosity estimate of 35%, calculated retardation factor (Rf) values for each compound in the shallow groundwater at Site 24 (see Section 8.2.2 of the RI for this equation) are:

Parameter	**Rf**
Dieldrin	67.92
Methylene Chloride	1.04
Trichloroethene	1.63
Vinyl Chloride	1.29

When combined with the estimated groundwater horizontal pore velocity of 0.17 ft/day, an estimate of the time required for each compound to travel via shallow groundwater 100 feet across

the site can be calculated. The time required for shallow groundwater to travel 100 feet across the site is calculated as follows:

100 ft /0.17 (ft/day) = 588.24 days or 1.61 years

The calculated time required for each compound to travel 100 feet across the site is:

Parameter	**Rf**		**Ts**		
Dieldrin	67.92	x	1.61	=	109.35 years
Methylene Chloride	1.04	x	1.61	=	1.67 years
Trichloroethene	1.63	x	1.61	=	2.62 years
Vinyl Chloride	1.29	x	1.61	=	2.08 years

where Ts equals the time calculated for shallow groundwater to travel 100 feet across the site.

This information gives a relative indication of the degree to which the aquifer's physical properties inhibit the transport of these organic compounds (primarily via sorption to organic particles) within the shallow groundwater flow system, and the comparative differences in their migration rates. As shown, low-solubility compounds such as pesticides (i.e., dieldrin) are relatively immobile compared to the more soluble VOCs. In reality, additional fate processes such as molecular diffusion, physical dispersion, and chemical degradation combine with sorption, further impeding the transport of organics through the flow system.

5.5.4 Surface Soil-to-Air Transport

The surface soil-to-air pathway applies to fugitive dusts and VOCs in soil released to the atmosphere. No VOCs were identified in surface or subsurface soil at either site; therefore, their migration is not a concern. Site 8 is almost completely paved with asphalt, removing the concern of the fugitive dust migration. Site 24 is primarily unpaved land surface with moderate grassy vegetative cover. All detected surface soil concentrations are below the surface soil-to-air transfer screening RBCs. Furthermore, the results of E&E's 1991 air monitoring indicated that Site 24 is not a significant source of air particulates (E&E, 1991). Based on this information, the surface soil-to-air migration pathway at both Sites 8 and 24 is not viable. The various soil exposure scenarios are further evaluated in the Baseline Risk Assessment found in the RI and summarized in Section 6.

5.5.5 Other Pathways

Other potential migration pathways from the combined site area include groundwater discharge to downgradient surface water bodies and (surface water body-related) sediment. As stated above, NAS Pensacola surface water bodies (Bayou Grande and wetland/tidally inlets) are being investigated separately. However, given the limited magnitude and extent of groundwater impacted at the site, and the significant distance of these sites to surface waters (approximately 3,500 feet), no impact to these features from Sites 8 and 24 is anticipated.

5.5.6 Current and Potential Use and Receptors

Site 8 is currently used by the NAS Pensacola PWC Maintenance/Material Department for offices and to store building materials on the paved area west of Building 3561. Miscellaneous office trailers and fenced storage, including Building 3678, are north of the building. The paved area east of the building is used for PWC storage and employee parking. The projected future site use is consistent with current use of office space and commercial storage.

Site 24 is located immediately north of Building 3561, near the northwest corner of the Barrancas National Cemetery. Nearly three quarters of the site is part of the Barrancas National Cemetery and contains multiple gravesites. The central and northern portions of Site 24 are primarily unpaved and sparsely covered with native grasses and trees. However, the fenced storage area around Building 3678, in Site 24's southern portion, has a gravel/crushed shell land surface. An unimproved dirt road runs west to east across the site's center. The site is currently used as a buffer zone between John H. Towers Road and the Barrancas National Cemetery and for cemetery burials. The projected future site use is consistent with current use of undeveloped buffer zone and cemetery burials.

Transport of parameters detected at Sites 8 and 24 is generally downward from surface soil through subsurface soil to groundwater. The primary receiving body of site impact is the surficial zone of the Sand-and-Gravel Aquifer. As described in the RI and Section 2, the surficial zone is a porous and permeable unconfined aquifer with relatively small amounts of organic carbon, all of which make it a viable migration pathway for dissolved and entrained contaminants, particularly organic compounds. It is not used as a water-supply source in the Pensacola area due to its high iron and aluminum content and its susceptibility to local contamination. The extent of inorganic and organic parameter exceedances in shallow groundwater is generally limited to the combined site area, indicating substantial contaminant migration is not occurring.

A potential receptor of surficial aquifer zone contamination from Site 8 and 24 is the main producing zone, which underlies the surficial zone and serves as a potable water source for wells north and upgradient in Escambia County. Water from the main producing zone is not used as a potable supply at NAS Pensacola because of its high iron and aluminum content, but the aquifer is used as a supplementary water source for fire control at the base. No future change to groundwater use is anticipated. The main producing zone is separated from the surficial zone by a low-permeability clay layer. A low-permeability sandy clay was documented at 65 feet bls at nearby well location 01GI66 (approximately 250 feet west-northwest of Site 24), corresponding to the low-permeability zone which separates the surficial from the main producing zone. Given that cleanup criteria exceedances in OU 13 shallow groundwater are relatively low in magnitude, groundwater from the low-permeability and main producing zones is not expected to be impacted by site activities and was not sampled for this investigation.

Other potential receptors of surficial zone contaminants are downgradient surface waters Bayou Grande and associated tidal ponds. As previously discussed, the distance of the sites to these features, coupled with the magnitude and limited extent of detected groundwater constituents, makes impact to these receptors highly unlikely. However, surface water, sediment, and associated ecological receptors at NAS Pensacola will be evaluated fully during the Sites 40 and 41 RIs, for Bayou Grande and the wetlands, respectively.

6.0 SUMMARY OF SITE RISKS

A baseline risk assessment (BRA) has been conducted for OU 13, and the results are presented in Section 9 of the RI report. The BRA, which was based on contaminated environmental site media as identified in the RI, was conducted to assess the resulting impact to human health and environment. The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Because the State of Florida considers all groundwater to be potable, the basis for taking action at OU 13 is the presence of contaminants in groundwater exceeding drinking water standards.

6.1 Human Health Risk Assessment

Several inorganic and organic parameters have been identified as contaminants of concern (COCs) in the human health component of the baseline risk assessment (BRA) with regard to specific land use scenarios. Although the BRA presented risks for both soil and groundwater, the IRA completed in October 2004 has eliminated the human health and leachability risk from Site 8 soil. Therefore, only Site 24 soil and Site 8 and 24 groundwater will be presented here. It should be noted that not all exposure scenarios used in the HHRA are realistic given the site's current and projected use.

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Risk = CDI X SF

Where: risk = a unitless probability of an individual's developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as $(mg/kg\text{-}day)^{-1}$.

These risks are probabilities that usually are expressed in scientific notation (e.g., $1x10^{-6}$). An excess lifetime cancer risk of $1x10^{-6}$ indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been

estimated to be as high as one in three. EPA's generally acceptable risk range from site-related exposures is 10^{-4} to 10^{-6}. FDEP's acceptable risk level is 10^{-6}.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived from a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The hazard index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (i.e., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI>1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

Where:

CDI = chronic daily intake
RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Site 24 Soil

BEQs, arsenic, chlordane, dieldrin, and heptachlor epoxide each contribute to the estimated risk for one or more of the soil exposure pathways evaluated for Site 24. Three exposure groups were considered in the evaluation for Site 24: future site workers, current adult maintenance workers, and hypothetical future residents (child and adult). Based on RI results, a small (approximately 0.5 acre) subarea along John H. Tower Road on the western boundary of the site, represented roughly by soil samples from borings 24S03, 24S10, 24S11, and 24S12, was the primary area of impact for most soil contaminants of potential concern (COPCs). As a result, exposure was evaluated assuming focused residential and occupational use of this limited area. For the maintenance worker scenario, exposure was assumed to be uniform across the entire site. For the most

conservative residential scenario, noncarcinogenic COCs were not identified. BEQ was the principal contributor to an ILCR of $3x10^{-5}$ projected for the combined soil pathway. Arsenic, chlordane, dieldrin, and heptachlor epoxide were secondary contributors. Arsenic and BEQs were the only carcinogenic COCs identified relative to future site workers, with a projected combined ILCR of $6x10^{-6}$. No soil pathway-related COCs were identified under the current maintenance worker scenario. Table 6-1 presents the Site 24 soil risk summary.

As stated in Section 5, the detected BEQs are attributable to the adjacent road and vehicular traffic. Small pieces of asphalt were observed in the surface soil sample. Pesticides and arsenic are attributable to routine application in accordance with regulations and are not site-related. Therefore, no additional CERCLA action is required.

Table 6-1
Site 24 Soil Risk Summary

Exposure Pathway	Future Resident (child HI)	Future Resident Risk (ILCR)	Future Site Worker (HI)	Future Site Worker Risk (ILCR)	Maintenance Worker (HI)	Maintenance Worker Risk (ILCR)
Incidental Ingestion	0.7	2.3E-05	0.03	2.7E-06	0.008	6E-07
Dermal Contact	0.02	8.3E-06	0.02	3.5E-06	0.002	4E-07
Total	**0.72**	**3E-05**	**0.05**	**6E-06**	**0.01**	**1E-06**

Site 8 Groundwater

Cadmium, barium, iron, manganese, and zinc each contribute to the estimated risk for groundwater ingestion at Site 8. No carcinogenic COCs were identified in Site 8 groundwater. Groundwater hazard indices for future child and adult residents were projected to be 4.3 and 1.8, respectively for the ingestion pathway. Cadmium contributed approximately 60 percent of the hazard calculated for each scenario. Barium, iron, manganese, and zinc were secondary contributors to groundwater pathway-related hazard indices. A hazard index (HI) refers to noncarcinogenic effects and is the ratio for the level of exposure to an acceptable level for a contaminant of potential concern. An HI greater than or equal to 1.0 indicates that there may be a concern for noncarcinogenic health effects. For site workers, a HI of 0.7 was calculated, indicating that groundwater conditions are protective of site workers; however, groundwater at OU 13 is not currently used, and is not planned for use, as a potable water source. Table 6-2 summarizes Site 8's groundwater risk.

Table 6-2
Site 8 Groundwater Risk Summary

Exposure Pathway	Future Resident Child, HI	Future Resident Adult, HI	Future Site Worker, HI	ICLR
Groundwater Ingestion and Inhalation	4.3	1.8	0.7	None

Site 24 Groundwater

Several inorganics and organics contribute to the estimated risk for the groundwater ingestion exposure pathway at Site 24 (Table 6-3). For future site residents, a combined (ingestion and inhalation pathway) ILCR of 2.7x10-4 was calculated. Ninety-six percent of this risk was contributed from three compounds (arsenic, dieldrin, and vinyl chloride). Of these compounds, arsenic was not detected above its FPDWS at OU 13, dieldrin was detected above its FPDWS in only one monitoring well, and vinyl chloride was detected above its FPDWS in only one monitoring well. In addition, a future resident child combined HI of 14 was calculated for Site 24 groundwater, with 82% of the hazard contributed from four metals (arsenic, iron, antimony, and thallium). Arsenic was not detected above its FPDWS at OU 13. Iron, antimony, and thallium were detected in more than one monitoring well at Site 24. Because shallow groundwater is not currently used at NAS Pensacola, the exposure pathways evaluated are incomplete. As a result, no risk or hazard is posed by compounds in groundwater, assuming conditions do not change. For more detailed information about Site 24 risk, the reader is referred to the OU 13 RI.

Table 6-3
Site 24 Groundwater Risk Summary

Exposure Pathway	Future Resident Child, HI	Future Resident Risk, ICLR
Groundwater Ingestion and Inhalation	14	2.7E-04

Risk Summary

The extent of impacted media driving excess risk at Sites 8 and 24 is limited. The magnitude of this contamination is also low relative to most applicable or relevant and appropriate requirements (ARARs). This human heath risk analysis should be qualified based on factors that affect the exposure potential of humans to impacted media at these sites. The shallow groundwater of the surficial zone at both sites is not currently used as a groundwater source due to its poor ambient quality. Because higher quality water sources are available for the base system, shallow groundwater is unlikely to be used in the future. These two factors greatly reduce the actual exposure potential to groundwater at Sites 8 and 24.

Development of Remedial Goal Options

The BRA identified several COCs for Sites 8 and 24, and for each COC a set of remedial goal options (RGOs) was developed. Groundwater RGOs and the corresponding FPDWS or FSDWS are presented in Table 6-4. Many of the Ecological Chemicals of Potential Concern (ECPCs) for the COCs were below the RGO for the contaminant, as indicated in Table 6-4.

Table 6-4
RGOs for COCs in Groundwater (in µg/L)

		Residential		Industrial	
COC	**FPDWS or FSDWS**	**ILCR = 1x10-6 or HI = 1**	**ILCR = 1x10-5 or HI = 3**	**ILCR = 1x10-6 or HI = 1**	**ILCR = 1x10-5 or HI = 3**
Site 8					
Barium	2000	1,100	3,300	NC	NC
Cadmium[a]	5	7.8	23	NC	NC
Manganese	50	360	1,100	NC	NC
Zinc	5000	4,690	14,100	NC	NC
Site 24					
Arsenic	50	0.044	0.44	0.14	1.4
Antimony[a]	6	6	20	40	120
Benzene[a]	1	10	10	NC	NC
Cadmium	5	8	23	50	150
Chlordane (total)	2	0.051	0.51	NC	NC
4-4'-DDD	0.1	0.28	2.8	NC	NC
delta-BHC	0.05	0.011	0.11	NC	NC
Dieldrin	0.1	0.0041	0.041	0.01	0.1
1,4-Dichlorobenzene	75	1	10	NC	NC
1,1-Dichloroethene	7	0.086	0.86	NC	NC
1,2-Dichlorethene(cis)	70	100	230	NC	NC
Heptachlor	0.4	0.015	0.15	NC	NC
Heptachlor Epoxide	0.2	0.0073	0.073	NC	NC
Manganese[a]	50	360	1080	NC	NC
Nickel	100	300	1000	NC	NC
Tetrachloroethene	3	1	10	NC	NC
Thallium[a]	2	1	140	8	20
Trichloroethene[a]	3	4.7	47	NC	NC
Vinyl Chloride[a]	1	0.03	0.3	0.09	0.9
Zinc	5000	4.693	14,080	NC	NC

Notes:
NC = Not a COC
Concentrations are based on the lower required to obtain a hazard index = 1 or ILCR = 1x10-6.
a = Ecological Chemical of Potential Concern (ECPC) concentrations were above FGGC, FPDWS, or FSDWS. All other EPCs are below the FPDWS, FSDWS, or FGGC.

6.2 Ecological Risk Assessment

Based on the RI data, the model prediction of receptor species' dietary exposure to detected soil parameters appear to present a risk. However, the removal action performed at OU 13 has removed contaminated surface soil. Maximum 4-4'-DDD and lead surface soil concentrations exceeded the literature based no-observed-adverse-effect levels (NOAELs) for robin's dietary exposure. However, the NOAEL is a level that typically provides a low degree of confidence; therefore, the fact that these concentrations do not exceed the established lowest-observed-adverse-effect levels (LOAELs) is more significant.

Risk to potential receptors from dermal exposure to contaminants is expected to be negligible. Food chain biomagnification of lead is also considered unlikely, and it has been reported that forms of lead other than "shot" are unlikely to cause clinical signs of poisoning in birds (Eisler, 1988). Biouptake of other inorganic constituents by small mammals is not expected to represent a significant pathway due to the limited infaunal community associated with the grass field, as well as to the lack of floral diversity.

7.0 DESCRIPTION OF THE REMEDIAL ALTERNATIVES

The OU 13 FFS report presented the analysis of six potential remedial action alternatives — three addressing soil contamination and three addressing groundwater contamination. Note that the FFS was completed in 2000 before the IRA was conducted. With the results of the IRA now available, the soil alternatives are narrowed to only the no action alternative (S1) since no site-related contamination remains above residential cleanup levels.

In assembling alternatives, the NCP goal of evaluating a range of alternatives was considered, but due to small quantities, limited extent of contamination, and relatively low risk, the alternative array was limited. In keeping with this goal and constraint, the groundwater alternatives vary in level of effort from no-action to land use controls (LUCs), and LUCs with monitoring. No active remedial technologies were evaluated for groundwater due to the relatively low concentration of contamination, lack of potential current and future receptors, and the long remedial time frame and costs associated with treatment of inorganics at low concentrations. Alternatives respond to groundwater and soil remedial needs separately to facilitate development and evaluation. This section of the ROD summarizes the relevant alternatives described in the FFS report, consisting of:

Soil

- Alternative S1 No-Action

Groundwater

- Alternative G1 No-Action
- Alternative G2 LUCs
- Alternative G3 LUCs with Monitoring

7.1 Remedial Goals

The remedial goal (RG) for OU 13 was discussed during the October 1997 meeting among the Navy, USEPA, and FDEP. Following is the RG developed, based on the meeting minutes.

- Prevent ingestion of groundwater from the surficial zone of the Sand and Gravel Aquifer within the OU 13 boundaries until drinking water standards are met. Although the Sand and Gravel aquifer is unlikely to be used as a potable water source, the State of Florida regards it as a potential drinking water aquifer. The potential for domestic or industrial use of the surficial aquifer is minimal, particularly when better quality aquifers are readily available.

7.1.1 Groundwater Remediation Goals

Table 7-1 presents chemicals of concern and their RGs for OU 13 groundwater based on the July 2003 sampling event. Groundwater RGs are federal or state standards, whichever is more stringent. Inorganics exceeding MCLs, but below RCs, are considered to be background.

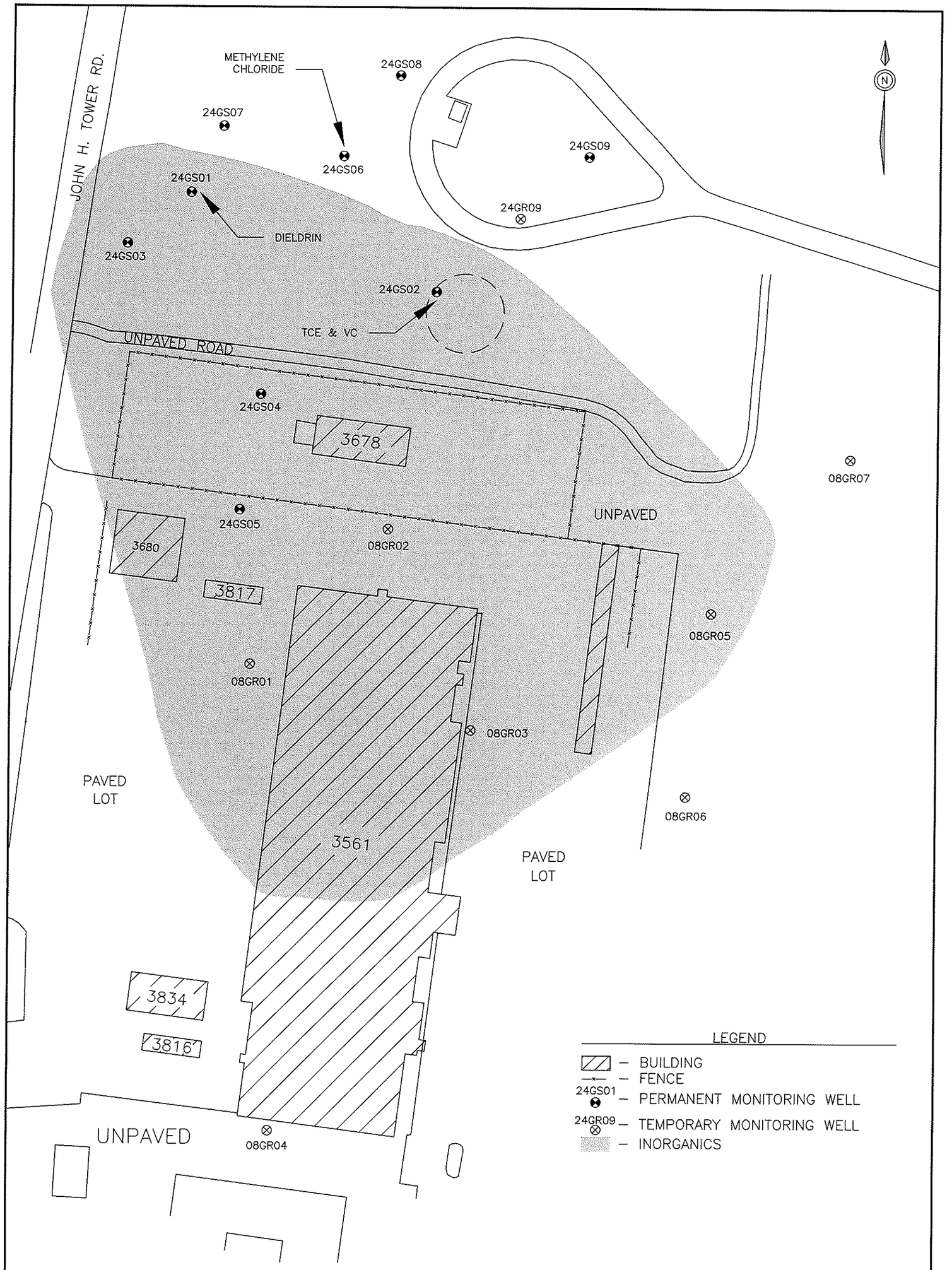
The areal extent of groundwater contamination greater than RGs is depicted in Figure 7-1. This plume is comprised of a variety of overlapping inorganic exceedances and thus individual inorganic plumes are not defined. Monitoring well 24GS04 had only one exceedance for aluminum, which was below the RC. However, it is included within the plume because it appears to be a clean "island" surrounded by contamination. The total groundwater remedial volume is estimated at 2.4 million gallons per pore volume, assuming an aquifer thickness of 25 ft, porosity of 35%, and areal extent of the plume of 8.32 acres.

Table 7-1
RGs for Groundwater (in µg/L)

Contaminant	Performance Standards	Source
Antimony	6	FPDWS
Cadmium	5	FPDWS
Dieldrin	0.002	FL GCTL, Chapter 62-777
Heptachlor epoxide	0.2	FPDWS
Iron	1,707	Reference Concentration
Lead	15	FPDWS
Manganese	50	FSDWS
Methylene Chloride	5	FPDWS
Nickel	100	FDPWS
Thallium	3.8	FPDWS
Trichloroethene	3	FPDWS
Vinyl Chloride	1	FPDWS

7.2 Alternative S1: No-Action

The NCP requires consideration of a no-action alternative as a baseline against which other alternatives are compared. Under this alternative, no remediation of contaminated soil will be conducted to reduce volume, mobility, or toxicity of surface soil, and no controls will be initiated to restrict future use or exposure to contaminated media. Because this scenario does not provide any controls to restrict future land use, residential use was evaluated. It is important to note that CERCLA, as amended, requires reevaluation of site contamination every 5 years.



RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA

FIGURE 7-1
GROUNDWATER REMEDIAL AREA

DWG DATE: 09/12/05 | NAME: 0083001W015

7.2.1 Cost

The only cost to the No-Action alternative is the 5-year evaluation cost. The 1998 cost for this review is estimated at $10,000. The present worth of reevaluation every 5 years for 30 years is approximately $24,400.

7.3 Alternative G1: No-Action

Under this alternative, no action is taken to treat or prevent exposure to contaminated groundwater at OU 13. This alternative assumes that the shallow groundwater at OU 13 is used as potable water supply.

7.3.1 Cost

Although not a remedy component, the no-action alternative would require reevaluation of the site every 5 years for an estimated 30 years. It is assumed that groundwater sampling would be performed every 5 years during this evaluation. The estimated cost of one monitoring event is $40,700 as shown in Table 7-2. The present worth of the reevaluation sampling (O&M) every 5 years for 30 years at a 6% discount rate is $99,400. There are no capital costs associated with this alternative.

Table 7-2
Alternative G1 Costs

Action	Quantity	Unit	Total Cost
	O&M Costs		
Sampling (field work and organization)	96 hrs Sr. Professional	$79/hr	$7,600
	80 hrs Jr. Professional	$64/hr	$5,100
	Travel	LS	$11,300
Miscellaneous Equipment, Field Supplies, etc.	Pump rental, generators, PPE	LS	$3,000
Laboratory Analysis	17 Samples (plus 5 QA/QC)Pest & Metals	$300/each	$6,600
	17 Samples (plus 9 QA/QC) VOCs	$150/each	$3,900
Reporting/engineering	40 hrs Sr. Professional	$79/hr	$3,200
		Subtotal	$40,700
		Present Worth at 6% discount for 30 years	$99,400
		Alternative 1 Total Cost	$99,400

Notes:
All costs are rounded.
LS = Lump sum

7.4 Alternative G2: LUCs

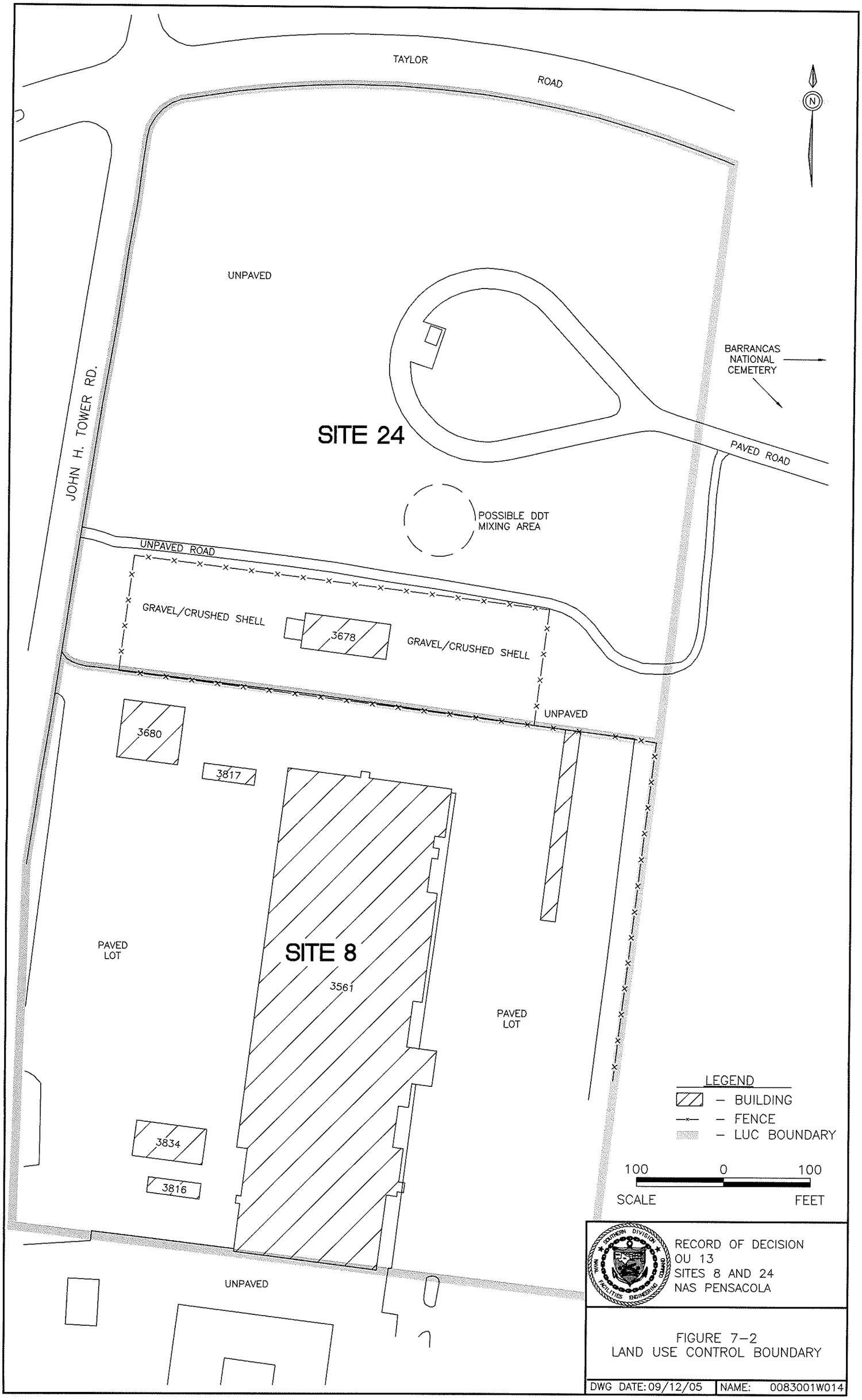
Under this alternative, no remedial actions would be taken to reduce, treat, or decrease the mobility or toxicity of on-site groundwater contamination. However, LUCs would be implemented to restrict groundwater use until cleanup levels are met, thereby limiting unacceptable exposure to contamination. This remedy will be reviewed every five years as part of the requirements of Section 121 CERCLA to evaluate weather it continues to adequately protect human health and the environment. The LUC boundary is shown on Figure 7-2. A LUC Remedial Design (RD) work plan will be prepared as the land use component of the RD. In accordance with the Site Management Plan and the NAS Pensacola Federal Facilities Agreement, the Navy shall prepare and submit a LUC RD that shall contain implementation and maintenance actions, including periodic inspections to EPA and FDEP. This alternative does not require any changes to existing activities, since current activities at OU 13 (including a PWC and cemetery) do not use the surficial aquifer as a potable water source.

LUCs will be implemented through administrative procedures to provide protection to human health. The site area will be formally documented as non-residential use in the Base Master Plan. At any time that a property is considered for an alternative use or any intrusive activities are planned, a site approval or dig permit process is initiated. The restricted area will be delineated and the restriction will be described in the Base Master Plan. Enforcement will be achieved through the Activity's site approval and Dig Permit processes. The site use and Dig Permits must be approved by the Activity Environmental Office before any intrusive or construction activities are performed. Re-evaluation will be required for any land use changes. The RD work plan will outline implementation actions for the LUCs.

The Navy estimates the net present worth of Alternative G2 at $149,400, including $50,000 to implement LUCs (capital cost) and a 5-year review cost of $99,400 (O&M).

7.5 Alternative G3: LUCs with Monitoring

Under this alternative, no remedial actions would be taken to reduce, treat, or decrease the mobility or toxicity of onsite groundwater contamination. However, LUCs would be implemented to restrict groundwater use until cleanup levels are met, thereby precluding potential unacceptable exposures to contamination. The LUC boundary is shown in Figure 7-2. This alternative does not require any changes to existing activities, since current activities at OU 13 (including a PWC and cemetery) do not use the surficial aquifer for a potable water source. All provisions of Alternative G2: LUC are included in Alternative G3: LUC with Monitoring. A LUC Remedial Design (RD) work


TAYLOR ROAD
N
UNPAVED
JOHN H. TOWER RD.
BARRANCAS NATIONAL CEMETERY
SITE 24
PAVED ROAD
POSSIBLE DDT MIXING AREA
UNPAVED ROAD
GRAVEL/CRUSHED SHELL
3678
GRAVEL/CRUSHED SHELL
UNPAVED
3680
3817
PAVED LOT
SITE 8
3561
PAVED LOT
3834
3816
UNPAVED
LEGEND
– BUILDING
– FENCE
– LUC BOUNDARY
100 0 100
SCALE FEET
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
RECORD OF DECISION
OU 13
SITES 8 AND 24
NAS PENSACOLA
FIGURE 7–2
LAND USE CONTROL BOUNDARY
DWG DATE: 09/12/05
NAME: 0083001W014

Plan will be prepared as the land use component of the RD. In accordance with the Site Management Plan and the NAS Pensacola Federal Facilities Agreement, the Navy shall prepare and submit for a LUC RD that shall contain implementation and maintenance actions, including periodic inspections to EPA and FDEP.

In addition, this alternative will implement a monitoring program to track the groundwater plume's migration and ensure that concentrations of COCs as they leave the site are at acceptable levels. Implementation of this alternative does not require any innovative technologies or construction activities. Many contractors are available in Florida to perform groundwater monitoring activities.

The Navy estimates Alternative G3's present worth cost including monitoring is $610,200. This cost assumes $50,000 for LUC implementation (capital costs) and a groundwater monitoring present worth cost of $560,200, assuming annual sampling for 30 years and discount rate of 6% (O&M costs). Itemized costs for groundwater monitoring are presented in Table 7-3.

Table 7-3
Groundwater Monitoring Costs

Action	Quantity	Unit Cost	Total
Capital Costs			
Institutional Controls	1	$50,000	$50,000
O&M Costs			
Sampling (field work and organization)	96 hrs Sr. Professional	$79/hr	$7,600
	80 hrs Jr. Professional	$64/hr	$5,100
	Travel	LS	$11,300
Miscellaneous Equipment, Field Supplies, etc.	Pump rental, generators, PPE	LS	$3,000
Laboratory Analysis	17 Samples (plus 5 QA/QC) Pest & Metals	$300/each	$6,600
		$150/each	$3,900
	17 Samples (plus 9 QA/QC) VOCs		
Reporting/engineering	40 hrs Sr. Professional	$79/hr	$3,200
		Subtotal	$40,700
		Present Worth for annual sampling at 6% discount for 30 years	$560,200
		Total Cost Monitoring	$560,200
		Alternative G3 Total Cost	$610,200

Notes:
All costs are rounded.
LS = Lump sum
PPE = personal protective equipment

7.6 Applicable or Relevant and Appropriate Requirements

The remedial action for OU 13, under CERCLA Section 121(d), must comply with federal and state environmental laws that are either applicable or relevant and appropriate. Applicable requirements are standards, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those that, while not applicable, still address problems or situations sufficiently similar to those encountered onsite that their use is well-suited to the particular site. To-be-considered (TBC) criteria are nonpromulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary level of cleanup for protection of health or the environment.

While TBCs do not have the status of ARARs, the approach to determining if a remedial action is protective of human health and the environment involves consideration of TBCs, along with ARARs. Potential ARARs for all of the alternatives are presented in the feasibility study completed for OU 13.

Chemical-specific ARARs are specific numerical quantity restrictions on individually listed chemicals in specific media. An example of a chemical-specific ARAR is the MCLs specified under the Drinking Water Act. Since there are usually numerous chemicals of concern for any remedial site, various numerical quantity requirements can be ARARs. Table 7-4 lists chemical-specific ARARs for the selected remedy at OU 13.

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. No action-specific ARARs or TBCs are identified for the selected remedy at OU 13.

Table 7-4
ARARs for LUCs and LUCs with Monitoring
NAS Pensacola OU 13

Requirements	Status	Requirement Synopsis	Application to the RI/FS
Federal Requirements			
Safe Drinking Water Act MCLs 40 CFR 141.11 - 141.16	Relevant and Appropriate	MCLs have been set for toxic compounds as enforceable standards for public drinking water systems. SMCLs are unenforceable goals regulating the aesthetic quality of drinking water.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below OU 13 are above MCLs and SMCLs.
Safe Drinking Water Act MCLGs 40 CFR 141.50-141.51	Relevant and Appropriate	MCLGs are unenforceable goals under the SDWA.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below OU 13 are above MCLGs.
State Requirements			
Florida Drinking Water Standards, Monitoring, and Reporting Title 62 Chapter 62-550	Applicable	Establishes Primary and Secondary MCLs for drinking water.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below OU 13 are above the state MCLs and SMCLs.
Florida Ground Water Classes, Standards and Exemptions, Title 62, Chapter 62-520	Applicable	Establishes drinking water standards for drinking water aquifers.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below OU 13 are above the state MCLs and SMCLs
Florida Contaminant Cleanup Target Levels, Title 62, Chapter 62-777	Applicable	Provides Groundwater Cleanup Target Levels	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water.
Florida Contaminated Site Cleanup Criteria, Title 62, Chapter 62-780	Applicable	Establishes risk based corrective action process for contaminated sites	

8.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the ROD provides the basis for determining which alternative provides the best balance with respect to the statutory balancing criteria in Section 121 of CERCLA, 42 U.S.C. Section 9621, and in the NCP, 40 CFR, Section 300.430. The major objective of the FFS was to develop, screen, and evaluate alternatives for remediating OU 13. Alternatives and technologies were identified as potential candidates to remediate the contamination at OU 13. These were screened based on their feasibility with respect to the contaminants present and site characteristics. After the initial screening, the remaining alternatives/technologies were combined into potential remedial alternatives and evaluated in detail. The remedial alternatives for soil and groundwater were selected from the screening process using the following nine evaluation criteria:

- Overall protection of human health and the environment.
- Compliance with applicable and/or relevant federal or state public health or environmental standards.
- Long-term effectiveness and permanence.
- Reduction of toxicity, mobility, or volume of hazardous substances or contaminants.
- Short-term effectiveness or the impacts a remedy might have on the community, workers, or the environment during implementation.
- Implementability, that is, the administrative or technical capacity to carry out the alternative.
- Cost-effectiveness, considering costs for construction, operation, and maintenance of the alternative over the life of the project, including additional costs should it fail.
- Acceptance by the state.
- Acceptance by the community.

The NCP categorizes these nine criteria into three groups:

- Threshold Criteria — Overall protection of human health and the environment and compliance with ARARs (or invoking a waiver) are threshold criteria that must be satisfied for an alternative to be eligible for selection.

- Primary Balancing Criteria — Long-term effectiveness and permanence; reduction of toxicity, mobility or volume; short-term effectiveness; implementability and cost are primary balancing factors used to weigh major trade-offs among alternative hazardous waste management strategies.

- Modifying Criteria — State and community acceptance are modifying criteria that are formally taken into account after public comments are received on the proposed plan and incorporated into ROD.

The selected alternative must meet the threshold criteria and comply with all ARARs or be granted a waiver for compliance with ARARs. Any alternative that does not satisfy both of these requirements is not eligible for selection. The Primary Balancing Criteria are the technical criteria upon which the detailed analysis of alternatives is primarily based. The final two criteria, known as Modifying Criteria, assess the acceptance of the alternative.

The following analysis summarizes the evaluation of alternatives for remediating OU 13 under each of the criteria. Each alternative is compared for achievement of a specific criterion. Groundwater alternatives are assessed separately from soil alternatives, consistent with previous sections of the ROD.

8.1 Threshold Criteria

Overall Protection of Human Health and the Environment

As discussed in Section 5.5, groundwater exceeded federal and state drinking water standards, posing a potential risk to future receptors. Because site groundwater is not used as a potable source, no current pathways exist. Potential for future groundwater consumption exists but is unlikely.

If the Sand-and-Gravel Aquifer is ever used as a potable water source, Alternative G1: No-Action will not provide protection. Exposure via ingestion of shallow/intermediate groundwater presents a potential risk to human health.

Alternative G2 provides for LUCs until cleanup levels are met which would prevent the use of the aquifer at OU 13 as a potable water source. LUCs will be implemented through administrative procedures to provide protection to human health. The site area will be formally documented as non-residential use in the Base Master Plan. At any time that a property is considered for an alternative use or any intrusive activities are planned, a site approval or dig permit process is initiated. The restricted area will be delineated and the restriction will be described in the Base Master Plan. Enforcement will be achieved through the Activity's site approval and Dig Permit processes. The site use and Dig Permits must be approved by the Activity Environmental Office before any intrusive or construction activities are performed. Re-evaluation will be required for any land use changes. The RD work plan will outline implementation actions for the LUCs.

Through administratively controlling exposure to the groundwater, potential consumption/inhalation is precluded. G2 does not provide for evaluation of risks to future downgradient receptors. A golf course, which does not use water from the surficial aquifer, is currently downgradient and will likely remain for many years. Discharge to a wetland 800 feet north of Taylor Road is the only potential exposure pathway identified under current and expected conditions. RI data indicate that concentrations of COCs are being reduced to acceptable levels before reaching OU 13's northern boundary. Considering this process, any groundwater reaching the wetland would likely have concentrations at acceptable concentrations and would not be likely to pose risk to any receptors.

Alternative G3, LUCs with monitoring, would provide the same protection as Alternative G2; however, under this alternative, monitoring of plume migration would be continued to ensure that plume contamination is being sufficiently tracked before crossing OU 13's boundary and as necessary, addressed through subsequent remedial measures.

Compliance with ARARs

The natural degradation process is the primary mechanism in all alternatives; final compliance with ARARs is possible, but not quantifiable, at this time. Alternative G2 does not evaluate when compliance with MCLs was achieved. Alternative G3 evaluates the plume's compliance with ARARs. Under all alternatives, groundwater with chemical concentrations greater than MCLs would remain.

However, the aquifer is not a drinking water source; MCL exceedances are not impacting receptors at this time. While G1 does not control future use, alternatives G2 and G3 both prevent impacts by precluding potential exposure.

8.2 Primary Balancing Criteria

Five primary balancing criteria typically highlight the major differences between alternatives. These criteria include: long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost.

Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence criterion assesses the results of a remedial action in terms of the risk remaining onsite, particularly in terms of the magnitude of remedial risk and the adequacy and reliability of controls.

Long-term effectiveness for all three alternatives is based on natural processes, which may or may not achieve RGs. The actual site risks are minimal because the aquifer is not used as a drinking water source. Site contaminants would decay naturally; these mechanisms are permanent. Alternatives G2 and G3 provide LUCs which would prevent consumption of site groundwater, and therefore eliminate risks due to groundwater contamination. Alternative G3, by implementing a monitoring program, would document long-term effectiveness.

Reduction of Toxicity, Mobility, and Volume through Treatment

No alternatives considered reduce the toxicity, mobility, or volume of contaminants through treatment other than natural attenuation degradation mechanisms.

Short-Term Effectiveness

No short-term effectiveness issues are associated with any alternatives considered.

Implementability

All alternatives considered are implementable.

Cost

The costs for each alternative are presented in Table 8-1.

Table 8-1
Groundwater Alternatives Cost Comparison

Alternative	Description	Capital Costs	O&M	Total Net Present Worth Cost*
Alternative G1	No-Action	$0	$99,400	$99,400
Alternative G2	LUCs	$50,000	$99,400	$149,400
Alternative G3	LUCs w/ Monitoring	$50,000	$560,200	$610,200

Note:
* assumes a 6% discount for 30 years

8.3 Modifying Criteria

State Acceptance

FDEP has concurred with the selection of Alternative G3 for OU 13 groundwater.

Community Acceptance

A public comment period was held from July 1, 2005, through August 14, 2005, to ensure that the community fully understands the selected alternative and that community concerns have been considered. No comments were received during the comment period.

9.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, the Navy has selected Alternative S1, No Action for soil at OU 13 and Alternative G3, LUCs with groundwater monitoring, to address groundwater contamination at OU 13. With the implementation of these alternatives, the site will be protective of human health and the environment.

The evaluation of alternatives conducted for OU 13 was consistent with the requirements of Section 121 of CERCLA and the NCP. Based on the information available at this time, the selected alternatives represent the best balance among the criteria used to evaluate remedies. Alternative S1 presents no risk to human health or the environment. Alternative G3 will not reduce the mobility, toxicity, and volume of groundwater contamination onsite, except through natural methods. Both alternatives can be implemented, will be protective of human health and the environment, are cost-effective, and result in permanent solutions to the maximum extent practicable. Alternative S1 attains all federal and state ARARs. Groundwater contaminant migration above cleanup levels appears to decrease before reaching OU 13's boundary; under current and planned site uses the groundwater exposure pathway is incomplete.

9.1 Source Control

Because the removal action was performed, site soil poses no risk. Groundwater onsite currently exceeds RGs. However, natural degradation appears to be occurring and there is no evidence of contaminant migration offsite. Furthermore, the surficial aquifer is not likely to be used for potable water due to its low quality. Source control remediation will address restricting exposure to contaminated groundwater. Source control shall include LUCs.

LUCs will be used to restrict groundwater use of the surficial zone of the Sand-and-Gravel Aquifer onsite. A LUC RD work plan will be prepared as the land use component of the RD. In accordance with the Site Management Plan and the NAS Pensacola Federal Facilities Agreement, the Navy shall prepare and submit a LUC RD that shall contain LUC implementation and maintenance actions, including periodic inspections, to USEPA and FDEP. The Navy is responsible for implementing, maintaining, reporting on, and enforcing the LUCs. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement or through other mean, the Navy shall retain ultimate responsibility for the remedial integrity.

9.2 Monitoring

Groundwater monitoring will be conducted in accordance with a Groundwater Monitoring Plan at OU 13 to evaluate the groundwater quality and determine whether contaminant migration is occurring. The major components of groundwater monitoring to be implemented are:

- Placement of LUCs to prevent use of groundwater in the surficial zone of the Sand-and-Gravel Aquifer onsite. The LUCs will be maintained until the concentration of hazardous substances in the groundwater are at such levels to allow unrestricted use and exposure.
- Implementation of a groundwater monitoring program to monitor achievement of performance standards listed in Table 9-1.

Table 9-1
Remedial Goals for Groundwater, µg/L

Contaminant	Remedial Goals	Source
Antimony	6	FPDWS
Cadmium	5	FPDWS
Dieldrin	0.002	FL GCTL, Chapter 62-777
Heptachlor epoxide	0.2	FPDWS
Iron	1,707	Reference Concentration
Lead	15	FPDWS
Manganese	50	FSDWS
Methylene Chloride	5	FPDWS
Nickel	100	FDPWS
Thallium	3.8	FPDWS
Trichloroethene	3	FPDWS
Vinyl Chloride	1	FPDWS

Notes:
FPDWS = Florida Primary Drinking Water Standard
GCTL = Groundwater Cleanup Target Level

9.3 Compliance Testing

Groundwater will be monitored at OU 13 pursuant to the monitoring plan requirements. If monitoring results indicate groundwater quality is deteriorating due to contaminants from OU 13 or contamination is migrating offsite, additional groundwater remediation measures will be evaluated for implementation as necessary.

10.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, 42 U.S.C. § 9621, the Navy must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy at OU 13 meets these statutory requirements.

10.1 Protection of Human Health and the Environment

The selected remedies protect human health and the environment by eliminating, reducing, and controlling risk through LUCs, soil removal to industrial risk levels, and groundwater monitoring as described in Section 9. LUCs will prevent exposure to contaminants in soil and groundwater.

10.2 Attainment of the ARARs

Remedial actions performed under CERCLA, Section 121, 42 U.S.C. § 9621 must comply with all ARARs. All alternatives considered for OU 13 were evaluated based on the degree to which they complied with these requirements. The selected alternative for groundwater contamination will not result in ARAR compliance in the short term. However, potential future groundwater consumption will be precluded via LUCs and natural attenuation over time should result in ARAR attainment longer term.

10.3 Cost-Effectiveness

The Navy believes the selected remedies, Alternatives S1 and G3, will eliminate risks to human health at a total estimated cost of $887,400. These alternatives are expected to achieve a comparable effectiveness at a lower cost than the other alternatives. Alternatives S1 and G3 provide an overall effectiveness proportionate to their costs, such that they represent a reasonable value achieved for the investment.

10.4 Use of Permanent Solutions to the Maximum Extent Practicable

The Navy and USEPA with FDEP concurrence have determined that the selected remedies represent the maximum extent to which permanent solutions and treatment technologies can be used cost-effectively for final remediation at OU 13 at NAS Pensacola. Of those alternatives that protect human health and the environment and comply with ARARs, the Navy and USEPA with FDEP concurrence have determined that these selected remedies provide the best balance of

trade-offs in long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness; implementability; and cost, while also considering the statutory preference for treatment as a principal element and consideration of state and community acceptance. The selected remedies provide for long-term effectiveness and permanence; are easily implemented; reduce toxicity, mobility, or volume, and are cost-effective.

10.5 Preference for Treatment as a Principal Element

Due to the small volumes of soil involved, removal of contaminated soil is the most practical solution for OU13. Analytical results indicate reduction of COC concentrations is occurring by natural attenuation; groundwater monitoring will be conducted to evaluate the progress of natural attenuation in the future. Because shallow groundwater is not a likely source of drinking water, treatment beyond natural attenuation is not practicable for OU 13. These actions satisfy the statutory preference for treatment.

10.6 Five-Year Review

Because the remedial action results in hazardous substances, pollutants, or contaminants remaining onsite above the levels that allow for unlimited use and unrestricted exposure, five year reviews will be conducted on the site as required by NCP Sec. 300.430(f)(4)(ii).

11.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

No comments were received from the public on the proposed plan. Therefore, no significant changes are required.

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Appendix A
Glossary

This glossary defines terms used in this record of decision describing CERCLA activities. The definitions apply specifically to this record of decision and may have other meanings when used in different circumstances.

ADMINISTRATIVE RECORD: A file that contains all information used by the lead agency to make its decision in selecting a response action under CERCLA. This file is to be available for public review and a copy is to be established at or near the site, usually at one of the information repositories. Also a duplicate is filed in a central location, such as a regional or state office.

AQUIFER: An underground formation of materials such as sand, soil, or gravel that can store and supply groundwater to wells and springs. Most aquifers used in the United States are within a thousand feet of the earth's surface.

BASELINE RISK ASSESSMENT: A study conducted as a supplement to a remedial investigation to determine the nature and extent of contamination at a Superfund site and the risks posed to public health and/or the environment.

CARCINOGEN: A substance that can cause cancer.

CLEANUP: Actions taken to deal with a release or threatened release of hazardous substances that could affect public health and/or the environment. The noun "cleanup" is often used broadly to describe various response actions or phases of remedial responses such as Remedial Investigation/Feasibility Study.

COMMENT PERIOD: A time during which the public can review and comment on various documents and actions taken, either by the Department of Defense installation or the USEPA. For example, a comment period is provided when USEPA proposes to add sites to the National Priorities List.

COMMUNITY RELATIONS: USEPA's, and subsequently Naval Air Station Pensacola's, program to inform and involve the public in the Superfund process and respond to community concerns.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a trust fund, commonly known as "Superfund," to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Under the program the USEPA can either:

- Pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work.

- Take legal action to force parties responsible for site contamination to clean up the site or pay back the federal government for the cost of the cleanup.

DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT (DERA): An account established by Congress to fund Department of Defense hazardous waste site cleanups, building demolition, and hazardous waste minimization. The account was established under the Superfund Amendments and Reauthorization Act.

DRINKING WATER STANDARDS: Standards for quality of drinking water that are set by both the USEPA and the FDEP.

EXPLANATION OF DIFFERENCES: After adoption of final remedial action plan, if any remedial or enforcement action is taken, or if any settlement or consent decree is entered into, and if the settlement or decree differs significantly from the final plan, the lead agency is required to publish an explanation of any significant differences and why they were made.

FEASIBILITY STUDY: See Remedial Investigation/Feasibility Study.

GROUNDWATER: Water beneath the earth's surface that fills pores between materials such as sand, soil or gravel. In aquifers, groundwater occurs in sufficient quantities that it can be used for drinking water, irrigation, and other purposes.

HAZARD INDEX (HI):

The sum of hazard quotients for substances that affect the same target organ or organ system. Because different pollutants may cause similar adverse health effects, it is often appropriate to combine hazard quotients associated with different substances. Exposures below a HI of 1.0 will likely not result in adverse noncancer health effects over a lifetime of exposure.

HAZARD RANKING SYSTEM (HRS): A scoring system used to evaluate relative risks to public health and the environment from releases or threatened releases of hazardous substances. USEPA and states use the HRS to calculate a site score, from 0 to 100, based on the actual or potential release of hazardous substances from a site through air, surface water, or groundwater to affect people. This score is the primary factor used to decide if a hazardous site should be placed on the NPL.

HAZARDOUS SUBSTANCES: Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

INFORMATION REPOSITORY: A file containing information, technical reports, and reference documents regarding a Superfund site. Information repositories for Naval Air Station Pensacola are at The John C. Pace Library at the University of West Florida and the NAS Pensacola Library in Building 633 on the Naval Air Station, Pensacola, Florida.

MAXIMUM CONTAMINANT LEVEL: National standards for acceptable concentrations of contaminants in drinking water. These standards are legally enforceable standards set by the USEPA under the Safe Drinking Water Act.

MONITORING WELLS: Wells drilled at specific locations on or off a hazardous waste site where groundwater can be sampled at selected depths and studied to assess the groundwater flow direction and the types and amounts of contaminants present, etc.

NATIONAL PRIORITIES LIST (NPL): The USEPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response using money from the trust fund. The list is based primarily on the score a site receives on the Hazard Ranking System. USEPA is required to update the NPL at least once a year.

PARTS PER BILLION (ppb)/PARTS PER MILLION (ppm): Units commonly used to express low concentrations of contaminants. For example, 1 ounce of trichloroethylene in a million ounces of water is 1 ppm; 1 ounce of trichloroethylene in a billion ounces of water is 1 ppb. If one drop of trichloroethylene is mixed in a competition-size swimming pool, the water will contain about 1 ppb of trichloroethylene.

PRELIMINARY REMEDIATION GOALS: Screening concentrations that are provided by the USEPA and the FDEP and are used in the assessment of the site for comparative purposes before remedial goals being set during the baseline risk assessment.

PROPOSED PLAN: A public participation requirement of SARA in which the lead agency summarizes for the public the preferred cleanup strategy, and the rationale for the preference, reviews the alternatives presented in the detailed analysis of the remedial investigation/feasibility study, and presents any waivers to cleanup standards of Section 121(d)(4) that may be proposed. This may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and comment on all alternatives under agency consideration.

RECORD OF DECISION (ROD): A public document that explains which cleanup alternative(s) will be used at NPL sites. The Record of Decision is based on information and technical analysis generated during the remedial investigation/feasibility study and consideration of public comments and community concerns.

REMEDIAL ACTION (RA): The actual construction or implementation phase that follows the RD and the selected cleanup alternative at a site on the NPL.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS): Investigation and analytical studies usually performed at the same time in an interactive process, and together referred to as the "RI/FS." They are intended to: (1) gather the data necessary to determine the type and extent of contamination at a Superfund site; (2) establish criteria for cleaning up the site; (3) identify and screen cleanup alternatives for remedial action; and (4) analyze in detail the technology, and costs of the alternatives.

REMEDIAL RESPONSE: A long-term action that stops or substantially reduces a release or threatened release of hazardous substances that is serious, but does not pose an immediate threat to public health and/or the environment.

REMOVAL ACTION: An immediate action performed quickly to address a release or threatened release of hazardous substances.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA): A federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and secure procedures to be used in treating, transporting, storing, and disposing of hazardous substances. RCRA is designed to prevent new, uncontrolled hazardous waste sites.

RESPONSE ACTION: As defined by Section 101(25) of CERCLA, means remove, removal, remedy, or remedial action, including enforcement activities related thereto.

RESPONSIVENESS SUMMARY: A summary of oral and written public comments received by the lead agency during a comment period on key documents, and the response to these comments prepared by the lead agency. The responsiveness summary is a key part of the ROD, highlighting community concerns for USEPA decision-makers.

SECONDARY DRINKING WATER STANDARDS: Secondary drinking water regulations are set by the USEPA and the FDEP. These guidelines are not designed to protect public health, instead they are

intended to protect "public welfare" by providing guidelines regarding the taste, odor, color, and other aesthetic aspects of drinking water which do no present a health risk.

SUPERFUND: The trust fund established by CERCLA which can be drawn upon to plan and conduct clean ups of past hazardous waste disposal sites, and current releases or threats of releases of nonpetroleum products. Superfund is often divided into removal, remedial, and enforcement components.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA): The public law enacted on October 17, 1986, to reauthorize the funding provisions, and to amend the authorities and requirements of CERCLA and associated laws. Section 120 of SARA requires that all federal facilities "be subject to and comply with, this act in the same manner and to the same extent as any non-governmental entity."

SURFACE WATER: Bodies of water that are aboveground, such as rivers, lakes, and streams.

VOLATILE ORGANIC COMPOUND: An organic (carbon-containing) compound that evaporates (volatizes) readily at room temperature.

Appendix B
Responsiveness Summary

RESPONSIVENESS SUMMARY

During the public comment period, the U.S. Navy proposed a preferred remedy to address soil and groundwater contamination at OU 13 on NAS Pensacola. This preferred remedy was selected in coordination with the USEPA and the FDEP. The NAS Pensacola Restoration Advisory Board, a group of community volunteers, reviewed the technical details of the selected remedy. The sections below describe the background of community involvement on the project and comments received during the public comment period.

Background of Community Involvement

Throughout the site's history, the community has been kept abreast of site activities through press releases to the local newspaper and television stations that reported on site activities. Site-related documents were made available to the public in the administrative record at information repositories maintained at the NAS Pensacola Library and The John C. Pace Library of the University of West Florida.

On July 3, 2005, newspaper announcements were placed to announce the public comment period (July 1, 2005 through August 14, 2005) and included a short description of the proposed plan. The announcement appeared in the *Pensacola News Journal.* In conjunction with the newspaper announcement, copies of the proposed plan were mailed to addresses on the Installation Restoration Program mailing list. The opportunity for a public meeting was provided.

Summary of Comments Received During the Public Comment Period

No comments were received during the public comment period.